2024

ACTIVE TRANSPORTATION PLAN

TAHOE REGIONAL PLANNING AGENCY || lake tahoe

FINAL
April 2024

2024 ACTIVE TRANSPORTATION PLAN PREFACE

The Tahoe Regional Planning Agency (TRPA), as the federally designated Metropolitan Planning Organization (MPO), is committed to keeping the Active Transportation Plan (ATP) up-to-date to ensure it supports the planning and funding needs of local jurisdictions. Every four years, TRPA assesses the need for a plan update. The 2024 ATP update will inform the 2025 Regional Transportation Plan (RTP) update. The 2024 ATP includes extensive public outreach, major changes to proposed facilities, new infrastructure recommendations, new policies and actions, and comprehensive data analysis and environmental screening, as outlined below.

Collaboration with Local Jurisdictions:
The ATP update would not have been possible without active participation from local jurisdictions. Implementing agencies provided updated project information, progress on planning, design, and funding of projects.

PLAN OVERVIEW:

Table of Contents
The Table of Contents and List of Figures & Tables have been updated with new page numbers, new map figures, and new tables.

Chapter 1: Introduction
The introduction includes a brief overview of the 2024 Active Transportation Plan update, highlighting key themes, plan organization, public outreach, local agency roles and responsibilities, as well as a brief explainer of Tahoe's regional land use.

Chapter 2: Existing Conditions and Needs Analysis
A fully updated needs assessment is a part of this update, as well as new data, maps, figures, and tables. This chapter introduces the Bicycle Levels of Traffic Stress and Pedestrian Experience Index analyses, current challenges and solutions to safety, connectivity, implementation, and maintenance issues.

Chapter 3: Goals, Policies, & Performance Measures
This chapter is helpful for agencies to align regional goals with local project development. It includes a brief overview of the future of active transportation in the Tahoe Basin, and how performance metrics dictate how the TRPA, as the Transportation Metropolitan Planning Organization (TMPO) and its partnering agencies, organizations, and private entities can work together to improve active transportation and increase its use.

Chapter 4: Network Recommendations
Each corridor map has been updated to illustrate existing conditions and highlight projects nearing implementation. Since the 2018 ATP adoption, new data analyses are available that enrich the existing and proposed infrastructure maps and project lists. This includes existing and proposed bicycle parking locations. Specifically, each corridor section now includes:

- New maps highlighting network recommendations
- A map of the existing and proposed bicycle and pedestrian infrastructure network (shared-use paths, sidewalks, bike lanes, bike routes, and bicycle parking)
- An updated map of the corridor crash analysis
- An updated priority project list

Chapter 5: Programs
This section provides an update on regional active transportation programs, such as Bike Month activities, Safe Routes to School, education, and awareness campaigns.

Chapter 6: Implementation Plan
This chapter provides a detailed look at how TRPA can best support implementation of our region's priority projects.

Appendices:

A. **Lake Tahoe Complete Streets Resource Guide**
B. **Tahoe Transportation Survey**
C. **Bicycle Level of Traffic Stress and Pedestrian Experience Index Technical Memos**
D. **Lake Tahoe Bicycle & Pedestrian Monitoring Protocol**
E. **Maintenance Responsibilities Chart and Template**
F. **Existing and Proposed Project List**
G. **Adoption Resolutions (posted after adoption)**

ACKNOWLEDGMENTS

The 2024 update to the Lake Tahoe Active Transportation Plan, formerly the Bicycle and Pedestrian Plan, is a collaborative process that includes robust community, stakeholder, and staff participation. Everyone plays an important role in shaping the vision and developing the content of these documents.

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TABLE OF CONTENTS

ACKNOWLEDGMENTS 3
LIST OF FIGURES & TABLES 8
REFERENCE LIST 11
GLOSSARY: ACRONYMS AND DEFINITIONS 16

CHAPTER 1: INTRODUCTION 1-1
1.1 PLAN OVERVIEW 1-2
1.2 STUDY AREA 1-6
1.3 BENEFITS OF ACTIVE TRANSPORTATION 1-17

CHAPTER 2: EXISTING CONDITIONS AND NEEDS ANALYSIS 2-1
2.1 EXISTING CONDITIONS 2-1
2.2 CHALLENGES & STRATEGIES 2-30

CHAPTER 3: GOALS, POLICIES, & PERFORMANCE MEASURES 3-1
3.1 GOALS 3-1
3.2 POLICIES 3-2
3.3 PERFORMANCE MEASURES 3-7
3.4 NOTABLE ACCOMPLISHMENTS 3-11

CHAPTER 4: NETWORK RECOMMENDATIONS 4-1
4.1 PROPOSED NETWORK 4-1

CHAPTER 5: PROGRAMS 5-1
5.1 ENCOURAGEMENT: 5-2
5.2 EDUCATION & AWARENESS: 5-5
5.3 EVALUATION 5-8

CHAPTER 6: IMPLEMENTATION PLAN 6-1
6.1 ACTIONS 6-2
6.2 BALANCING COST AND BENEFITS 6-4
6.3 COST ESTIMATES AND PROJECT PHASES 6-4
6.4 FUNDING STRATEGIES 6-6

APPENDICES:

A. **Lake Tahoe Complete Streets Resource Guide**
B. **Tahoe Transportation Survey**
C. **Bicycle Level of Traffic Stress and Pedestrian Experience Index Technical Memos**
D. **Lake Tahoe Bicycle & Pedestrian Monitoring Protocol**
E. **Maintenance Responsibilities Chart and Template**
F. **Existing and Proposed Project List**
G. **Adoption Resolutions (posted after adoption)**

LIST OF FIGURES & TABLES

FIGURES:

Figure 1-1: Lake Tahoe Region Map....1-7
Figure 1-2: Lake Tahoe Regional Corridors....1-9
Figure 1-3: Primary Mode of Transportation....1-19
Figure 1-4: Obesity vs. Activity....1-25
Figure 2-1: Regional Land Use and Town Centers....2-3
Figure 2-2: Regional Existing & Proposed Active Transportation Network Map....2-7
Figure 2-3: What type pf Cyclist do you most closely identify with?....2-8
Figure 2-4: Regional Bicycle Level of Traffic Stress (Segments)....2-11
Figure 2-5: Regional Bicycle Level of Traffic Stress (Intersections)....2-12
Figure 2-6: Regional Pedestrian Experience Map....2-14
Figure 2-7: Shared Mobility Scooter Trips Map....2-20
Figure 2-8: Existing Public Transit Walkshed Access....2-21
Figure 2-9: Permenant Bicycle and Pedestrian Count Locations....2-24
Figure 2-10: Total Bicycle and Pedestrian Counts per Year....2-25
Figure 2-11: Hourly Use of Select Sites....2-26
Figure 2-12: Monthly Usage Type by User....2-27
Figure 2-13: Lake Tahoe Bicycle and Pedestrian Severe and Fatal Collision Map....2-32
Figure 3-1: Miles of Network Constructed, 2010 -2014....3-6
Figure 4-1: SR 89/28 Corridor - Existing and Proposed Active Transportation Network....4-4
Figure 4-2: NV SR 28 Corridor - Existing and Proposed Active Transportation Network....4-17
Figure 4-3: U.S. 50 East Shore Corridor - Existing and Proposed Active Transportation Network....4-10
Figure 4-4: U.S. 50 South Shore Corridor - Existing and Proposed Active Transportation Network....4-13
Figure 4-5: Meyers / Y Corridor Existing and Proposed Active Transportation Network....4-17
Figure 4-6: SR 89 Recreation Corridor - Existing and Proposed Active Transportation Network....4-21
Figure 6-1: Priority Projects Map (Region)....6-3

TABLES

Table 1-1: Agencies & Responsibilities....1-11
Table 1-2: Tahoe Transportation Demographics....1-19
Table 2-1: Existing Facility Mileage....2-5
Table 2-2: Existing Bicycle and Safety Facilities....2-5
Table 2-3: Lake Tahoe Crash Data Statistics....2-31
Table 4-1: SR 89/28 Corridor Project List:....4-5
Table 4-2: NV SR 28 Corridor Project List....4-8
Table 4-3: US 50 East Shore Corridor Project List....4-11

Table 4-4: U.S. 50 South Shore Corridor Project List 4-14,4-15
Table 4-5: Meyers Y Corridor Project List 4-18,4-19
Table 4-6: SR 89 Recreation Corridor Project List 4-22
Table 5-1: Agencies Involved in Awareness Programming 5-1
Table 5-2: Safe Routes To School Education & Encouragement Program Outline 5-7
Table 6-1: Project Type High Level Cost Estimate 6-5

REFERENCE LIST

Advocacy Advance. (2014). *First Mile, Last Mile: How Federal Transit Funds can improve access to transit for people who walk and bike.*

American Association of State Highway and Transportation Officials. (2004). *Guide for Planning, Design, and Operation of Pedestrian Facilities.*

American Association of State Highway and Transportation Officials. (2012). *Guide for the Development of Bicycle Facilities, Fourth Edition.*

Angus, Hilary. (2023). *Why Businesses Want Bike Riding Customers.* Momentum Magazine. Retrieved from: https://momentummag.com/why-businesses-want-bike-riding-customers/

Barton Health. (2012). *PRC Community Health Needs Assessment Report.*

Bassett et al. (2008). *Walking, Cycling, and Obesity Rates in Europe, North America, and Australia.* Journal of Physical Health and Activity.

California Department of Transportation. (2013). *SR-89 Cascade to Rubicon Bay Bikeway Study.* Retrieved from: http://www.tahoempo.org/documents.aspx?SelectedIndex=6

California Department of Transportation. (2014). *California Manual on Uniform Traffic Control Devices.*

California Department of Transportation. (2014). *Complete Streets Implementation Plan 2.0.*

California Department of Transportation. (2014). *Design Flexibility in Multi-Modal Design Memo.*

California Department of Transportation. (2015). *Design Information Bulletin Number 89. Class IV Bikeway Guidance.*

California Regional Water Quality Control Board & Nevada Division of Environmental Protection. (2010). *Lake Tahoe Total Maximum Daily Load Report.*

City of South Lake Tahoe. (2015). *Tahoe Valley Area Plan.*

Douglas County. (2013). *Douglas County South Shore Area Plan.*

Dowling, Richard. (2008). *Multimodal Level of Service Analysis for Urban Streets: User Guide. National Cooperative Highway Research Program.* Transportation Research Board.

Federal Highway Administration. (2009). *Manual on Uniform Traffic Control Devices.*

Federal Highway Administration. (2013). *Bicycle and Pedestrian Facility Design Flexibility Memo.*

Federal Highway Administration. (2013). *Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public.*

Federal Highway Administration. (2015). *Revision of Thirteen Controlling Criteria for Design.*

Federal Highway Administration. (2015). *White Paper: Evaluating the Economic Benefits of Non-motorized Transportation.*

Green, Josh. (2013). *Bike Lanes & Property Values: Is there a Correlation?* Curbed.

Institute of Transportation Engineers. (2010). Designing Urban Walkable Thoroughfares.

Lawrie, J., J, Geunther, T. Cook, M.P. Meletiou, S.W. O' Brien. (2004). *The Economic Impact of Investments in Bicycle Facilities: A Case Study of the Northern Outer Banks*. Institute for Transportation Research and Education for the North Carolina Department of Transportation.

Lake Tahoe Bike Coalition. (2009). *Lake Tahoe Survey of Cycling Visitors.* Retrieved from: http://www.tahoebike.org/images/documents/laketahoesurvey.pdf

League for American Bicyclists. (2015). *Bike Law University: Vulnerable Road User Laws.* Retrieved from: http://bikeleague.org/content/bike-law-university-vulnerable-road-user-laws

Litman, Todd. (2015). *Evaluating Active Transportation Benefits and Costs: Guide to Valuing Walking and Cycling Improvements and Encouragement Programs.* Victoria Transport Policy Institute.

LSC Transportation Consultants, INC. (2014). *Technical Memorandum: Summary of Existing Transportation Conditions.* Prepared for the TTD and TMPO.

M. Winters, G. Davidson, D.N. Kao and K Teschke. (2011) "Motivators and deterrents to bicycling: comparing influences on decisions to ride", Transportation 38, 153-168.

Mekuria, Maaza, Furth Peter, & Nixon, Hilary. (2012). *Low –Stress Bicycling and Network Connectivity.* Mineta Transportation Institute.

National Association of City Transportation Officials. (2014). *Urban Street Design Guide.*

National Association of City Transportation Officials. (2014). *Urban Bikeway Design Guide.*

National Association of Realtors. (2015). *Millennials Favor Walkable Communities, Says New NAR Poll.* Retrieved from: http://www.realtor.org/news-releases/2015/07/millennials-favor-walkable-communities-says-new-nar-poll

Nevada Department of Transportation. (2006). *US 395, West US 50, SR 38, SR 207 and SR431 Landscape and Aesthetics Corridor Plan.*

Nevada Department of Transportation. (2006). *Nevada Strategic Highway Safety Plan.*

Nevada Department of Transportation. (2010). *Standard Plans for Road and Bridge Construction.*

Nevada Department of Transportation. (2013). *Nevada Statewide Bicycle Plan.*

Nevada Department of Transportation. (2014). *Standard Specifications for Road and Bridge Construction.*

North Lake Tahoe Resort Association. (2013). *North Lake Tahoe Community Wayfinding Signage Design Standards Manual.*

Owen, Sabrina. (May, 2015). Barton Community Health Advisory Committee meeting.

Pedestrian and Bicycle Information Center. (2024). *Environmental.* Retrieved from: https://www.pedbikeinfo.org/factsfigures/facts_environment.cfm

Pedestrian and Bicycle Information Center. (2015). *Bike Sharing.* Retrieved from: http://www.pedbikeinfo.org/programs/promote_bikeshare.cfm

Racca, D. & Dhanju, A. (2006). *Property Value/Desirability Effects of Bike Paths Adjacent to Residential Areas.* Center for Applied Demography & Survey Research.

Railstotrails.org. (2015). *Policy Basics*. http://www.railstotrails.org/policy/basics/

San Diego Area Council of Governments (SANDAG). (2012). *Integrating Transportation Demand Management into the Planning and Development Process.*

Smart Growth America. (2015). *National Complete Street Coalition.* Retrieved from:

http://www.smartgrowthamerica.org/complete-streets/complete-streets-fundamentals/complete-streets-faq

Szczepanski, Carolyn. (2013). *How Bicycles Bring Business.* Momentum Magazine. Retrieved from: https://momentummag.com/how-bicycles-bring-business/

Tahoe Regional Planning Agency. (2009). *Environmental, Economic, and Public Health Impacts of Shared Use Paths in Lake Tahoe.*

Tahoe Regional Planning Agency. (2010). *Lake Tahoe Regional Bicycle and Pedestrian Plan.*

Tahoe Regional Planning Agency. (2010). *Appendix K: Lake Tahoe Bicycle and Pedestrian Plan 2010 Use Estimation.*

Tahoe Regional Planning Agency. (2010). *Appendix A: Design and Maintenance Recommendations*

Tahoe Regional Planning Agency. (2012). *Regional Plan*

Tahoe Regional Planning Agency. (2012). *Regional Transportation Plan: Mobility 2035.*

Tahoe Regional Planning Agency. (2015). *2014 Annual Report.*

Tahoe Regional Planning Agency. (2015). *2015 Active Transportation Plan Survey.*

Tahoe Regional Planning Agency. (2015). *2015 Community Outreach Report.*

Tahoe Regional Planning Agency. (2015). *2015 Tahoe Basin ITS Strategic Plan.*

Tahoe Regional Planning Agency. (2015). *Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol.*

Tahoe Regional Planning Agency. (2015). *Lake Tahoe Unified School District Safe Routes to School Master Plan.*

Tahoe Regional Planning Agency. (2015). *Summer & Fall 2015 Data Collection Report.*

United States Census Bureau. (2020).

United States Environmental Protection Agency. (2014). *Greenhouse Gas Emissions from a Typical Passenger Vehicle.* Retrieved from: http://www3.epa.gov/otaq/climate/documents/420f14040a.pdf

York Common Cents. (2012). *Study: Bicyclists and Pedestrian Spend more money in stores than drivers.* Retrieved from: http://www.yorkblog.com/biz/2012/12/05/study-bicyclists-and-pedestrians-spend-more-money-in-stores-than-drivers/

GLOSSARY: ACRONYMS AND DEFINITIONS

2010 BPP: The 2010 Lake Tahoe Bicycle and Pedestrian Plan

ADA: The Americans with Disabilities Act, https://www.ada.gov/

Active Transportation:

Transportation that does not rely entirely on a car to travel between origin and destination. This can include walking, biking, skateboarding, roller-skating, cross country skiing, using public transit, or driving to an intercept lot, parking, and then using another form of travel.

AMBBR: America's Most Beautiful Bike Ride

ATP: Active Transportation Plan

The 2015 Survey: 2015 Active Transportation Plan Survey

Active Transportation Network:

The facilities such as shared-use paths, bike lanes, bike routes, sidewalks, and intersection designs that promote safety and convenient travel for bicycling and walking and other forms of active transportation. The network can include on-street and off-street facilities that appropriately integrate with the roadway and existing and planned land-use design.

Bicycle Level of Traffic Stress:

A traffic stress analysis that quantifies the amount of perceived stress a cyclist may encounter while utilizing the on or off street transportation network.

Bike Share:

A transportation program, ideal for short distance point to point trips providing users the ability to pick up a bicycle at any self-serve bike station and return it to any other bike station located within the system's service area.[1]

Caltrans: California Department of Transportation

CDC: Center for Disease Control

CIP: Capital Improvement Program

CMAQ: Congestion Mitigation and Air Quality Improvement Program

[1] Pedestrian and Bicycle Information Center, 2015

Complete Streets:

Complete streets are streets for everyone**.** They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. Complete streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations.[2]

CSLT: City of South Lake Tahoe

CTC: California Tahoe Conservancy

DMV: Department of Motor Vehicles

EIP: Environmental Improvement Program

FAST Act: Fixing America's Surface Transportation Act

FHWA: Federal Highway Administration

First and Last Mile:

Transit systems usually involve some multi-modal connection in order to get a person from point to point. This is referred to as the "first-and-last mile" problem. In order to encourage more ridership, transit needs to provide safe, accessible, and convenient options that enable point to point connections. Biking and walking can be a simple solution to encourage access to transit because active transportation can be more convenient than other modes.[3]

FLTP: Federal Lands Transportation Program

GIS: Geographic Information Systems

HSIP: Highway Safety Improvement Program

ICE: Intersection Control Evaluation

IVGID: Incline Village General Improvement District

Level of Traffic Stress (LTS):

An analysis that measures the ability for active transport users to travel between origin and destination without using links that exceed their tolerance for perceived safety and that do not involve an undue level of detour. There are four levels of traffic stress. LTS 1 is suitable for children; LTS 2, represents stress that most adults will tolerate; LTS 3 & 4 represent greater levels of stress. [4]

[2] Smart Growth America, 2015
[3] Advocacy Advance, 2014
[4] Mekuria, Furth, & Nixon, 2012

Tim Blagden, Executive Director of the Bike-Walk Alliance of New Hampshire, explains, “Low-stress streets that connect to places people want to go are the beginner slopes of bicycling.”

LTBC: Lake Tahoe Bicycle Coalition

LTUSD SRTS Master Plan: Lake Tahoe Unified School District Safe Routes to School Master Plan

MAP-21: Moving Ahead for Progress in the 21st Century

Multi-Modal Level of Service (MMLOS):

Multi-modal level of service analysis is a method for assessing how well an urban street serves the needs of all users. The method for evaluating the multi-modal level of service estimates the auto, bus, bicycle, and pedestrian level of service on an urban street using a combination of readily available data and data normally gathered by an agency to assess auto and transit level of service. The MMLOS user’s guide was published as NCHRP Document 128.

MTUCD: Manual on Uniform Traffic Control Devices

NDOT: Nevada Department of Transportation

NHPP: National Highway Performance Program

NHS: National Highway System

NTPUD: North Tahoe Public Utility District

Quality of Life in the Tahoe Region:

Provides for a unique identity and a sense of “place” for Lake Tahoe residents and visitors where they can walk, bike and play.

Sharrows:

“Sharrow” is short for “shared lane bicycle marking.” This pavement marking includes a bicycle symbol and two white chevrons and is used to remind motorists that bicyclists are allowed to use the full lane. Sharrows are also used for wayfinding and to correctly position the bicyclist.

SHSP: State Highway Safety Plan

SRTS: Safe Routes to School

STP: Surface Transportation Program

Support & End of Trip Facilities:

Facilities that accompany bicycle and pedestrian infrastructure such as bicycle parking, benches, transit shelters, water fountains, showers, and lockers.

SWITRS: Statewide Integrated Traffic Records System

RTP: Regional Transportation Plan, *Mobility 2035.*

TAC: Technical Advisory Committee

TAMBA: Tahoe Area Mountain Bike Association

TAP: Transportation Alternatives Program

TCPUD: Tahoe City Public Utility District

TDM: Transportation Demand management

TMDL: Total Maximum Daily Load

TMPO: Tahoe Metropolitan Planning Organization

TRPA: Tahoe Regional Planning Agency

TTD: Tahoe Transportation District

USEPA: United States Environmental Protection Agency

USFS: United States Forest Service

VMT: Vehicle Miles Traveled

Washoe County RTC: Washoe County Regional Transportation Commission

CHAPTER 1: INTRODUCTION

Lake Tahoe's quiet forests, expansive meadows, and sunny beaches invite and attract all types of outdoor enthusiasts and promote an active lifestyle. Lake Tahoe is a favorite playground not only for the Region's 55,836 residents[1], but also the more than 15 million yearly visitors that frequent the Tahoe Basin. The Tahoe Regional Planning Agency (TRPA) Regional Transportation Plan Sustainable Communities Strategy (RTP/SCS) and Active Transportation Plan (ATP) serve to connect residents and visitors to their destinations, while helping protect this beautiful natural environment by providing a framework for a comprehensive multi-modal transportation system.

Meyers Bikeway, Sawmill Pond Connection. Photo: Mike Vollmer

Bicycling, walking, rolling, and other forms of active transportation are important methods of travel that promote healthy lifestyles, improve air quality, reduce congestion, boost the local economy, and enhance the quality of life for the community's residents and visitors alike. Active transportation includes any method of travel that does not rely on a car to travel between origin and destination. This can include walking, biking, rolling (wheelchair, scooter, electric one-wheel, etc.), or cross-country skiing. This plan uses the terms "walking" and "pedestrian" broadly to include people of all ages and abilities, including those walking and those using assisted mobility devices like wheelchairs. It uses the term "bicycling" to include people riding traditional bicycles and a wide variety other human-powered and electric-assisted devices that use typical bicycle facilities, including devices adapted for use by people with disabilities. While the Tahoe Region takes great pride in its ample recreation and natural beauty the region provides, this plan focuses primarily on the transportation network element, and how to best connect residents and visitors with the restaurants, shops, trailheads, mobility hubs, places of employment, and homes in a way that does not require a personal automobile. By supporting these bicycle and pedestrian networks, TRPA is working toward its goal of reducing Vehicle Miles Traveled (VMT), which serves the region by protecting the environment and reducing congestion on Tahoe's roadway network.

[1] U.S. Census Bureau, 2020

1.1 PLAN OVERVIEW

The *2024 Active Transportation Plan (ATP, the plan)* presents a guide for planning, designing, constructing, and maintaining a regional active transportation network that includes international best practice infrastructure recommendations, support facilities, and awareness programs. The infrastructure network includes on and off-street bike facilities such as protected bicycle lanes, designated bicycle routes, and intersection designs that promote safe and convenient travel for bicycling, walking, and rolling. The network also includes off-street, shared-use paths, footbridges, and sidewalks that help connect users to destinations that the roadway does not typically carry them. This plan outlines goals, policies, and actions that support implementation of high priority projects and guides long-term policies and planning that will transform Tahoe's transportation system. To support this process, the plan includes analysis of existing conditions via an updated "Bicycle Level of Traffic Stress" (BLTS) and "Pedestrian Experience Index" (PEI) analyses, provides data for future projects, and outlines tiers of project priorities. To help ensure feasible implementation, the plan identifies potential funding sources and recommended designs to encourage consistent and safe access for our most vulnerable roadway users.

Plan Vision - Complete Streets

This plan seeks to improve the environment and quality of life in the Tahoe Region by increasing safe and convenient active transportation travel. While Lake Tahoe's active transportation network has made significant improvements since the last plan amendment in 2018, there is still much to accomplish in regard to helping the region achieve its goals. Many of the town centers throughout Tahoe are well positioned to be very bicycle and pedestrian friendly. The short-trip destination options of Tahoe's town centers lend themselves to bicycle, pedestrian, or even scooter trips. However, lack of sidewalk connectivity, existence of low-stress on-street bicycle networks, or general lack of reliable bicycle parking, are all barriers for people who may otherwise consider walking, biking, or rolling to their destination.

Another component of this plan's vision is to further hone the implementation of "complete streets[2]". Through a complete street approach, this plan promotes transportation projects that accommodate the needs of all travelers when designing transportation improvements on and off-roadways. Complete streets are designed and operated to facilitate safe, comfortable, and efficient travel for roadway users of all ages and abilities such as pedestrians, bicyclists, scooter riders, transit riders, motorists, commercial vehicles, and emergency vehicles. A complete street approach also supports economic vitality by designing for aesthetic improvements, place-making, and by building natural partnerships between private, public, and community entities. With all this in mind, TRPA recognizes that complete streets may not be a "one size fits all" approach. This can easily be seen in a residential neighborhood near a school, which may warrant more focus on bicycle or pedestrian travel and traffic calming, while main arterials may require a transit-centric focus with protected bicycle lanes. These catered visions for each respective need will help Tahoe plan and implement a more holistic vision for its transportation network while meeting its transportation and environmental goals. This vision can be realized by creating a high-quality environment that makes active transportation more appealing than driving in the Tahoe Region and beyond.

Tell us about Transportation in Tahoe!
Scan the QR Code to tell us about your safety and infrastructure concerns on Tahoe's roadways, whether you bike, walk, roll, drive, or take the bus.
bit.ly/TahoeTransportation
Questions?
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Rachael Shaw: rshaw@trpa.gov or (775) 589-5267
TAHOE REGIONAL PLANNING AGENCY

Plan Development and Approval Process

The 2024 Active Transportation Plan updates the previous plan, that was technically amended in 2018. To develop this plan, staff undertook more than five months of public and stakeholder outreach. TRPA planning staff also convened a Technical Advisory Committee (TAC) three times to collectively develop and review the plan's goals, policies, actions, and project criteria. The TAC invitees were made up of federal, state, local, and advocacy representatives. After all community and stakeholder feedback was consolidated and integrated into the draft plan, staff went back to each local jurisdiction to vet all recommendations with a specific focus on new infrastructure locations and actions related to goals and policies. Beyond the outreach and TAC engagement, staff developed a Tahoe Transportation Survey, which provided valuable community feedback incorporated into this plan.

[2] The modernization of the term "complete streets" has come to mean street infrastructure beyond simply transportation. This could apply to stormwater facilities, street furniture, transit infrastructure, or any placemaking feature that enhances the overall quality and character of a street. While all incredibly important components of complete streets planning, this plan and its reference to complete streets refers almost solely to the active transportation element of the definition.

TRPA released a draft of the plan for public comment on February 27, 2024. The final day to comment was March 27, 2024, and comments were incorporated into the plan as appropriate.

Overview of Public Outreach

Public input is an essential part of creating a strong active transportation plan that guides funding, planning, and implementation of the existing and future active transportation network. As the Region continues to focus on improving active transportation options, understanding users, who they are, how they act, what their needs are, and why, is critical. Comprehensive public participation, whether in the form of community member survey, tabling events, and agency stakeholder feedback, is the backbone of a successful active transportation plan. TRPA staff met with all local jurisdictions during the development of this plan and solicited detailed guidance from the Technical Advisory Committee through regular meetings.

Extensive outreach was conducted throughout Lake Tahoe and its surrounding areas to gain public input on the existing and future active transportation network. Activities included community gatherings, association presentations, booths at community events, and a bilingual survey available online and in hard copy from June 2023 to September 2023. Staff released an interactive webmap that allowed respondents to provide location specific feedback about the existing and proposed active transportation network. Staff collected feedback that clarified current active transportation trends in Tahoe, specific locations that are working well or need improvements and gathered quantitative and qualitative crash data to supplement law enforcement reporting. Additionally, the data collected helped identify the types of infrastructure that users are interested in seeing constructed in the Lake Tahoe Region and provides guidance for project prioritization. TRPA staff conducted many of these public outreach initiatives alongside TRPA's concurrent Vision Zero Strategy planning process.

Staff shared opportunities for input via flyer distribution, advertisements in print and online newspapers, social media, and coordination with partner networks such as Lake Tahoe Unified School District and the Lake Tahoe Bicycle Coalition. The range of outreach sought to reach a wide variety of demographics throughout the region. Because the Latino community makes up over 20 percent of the total regional population, all outreach materials were translated into Spanish, and bilingual staff offered interpretation services at tabling and community gatherings.

Additionally, the ATP incorporates feedback collected through TRPA's Transportation Equity Study, which was completed and endorsed by the Governing Board in 2023. Development of the study included significant public outreach and engagement with local community-based organizations and social services representatives, with a focus on Tahoe's priority communities including persons without private transportation, seniors, persons living below the poverty line, individuals with a disability, youth, and BIPOC (Black, Indigenous, and People of Color). The community collectively identified seven major barriers to accessing equitable transportation options, including the following which were of particular importance to the ATP update:

- **Accessibility and safety –** Network walkability, terrain, and ADA accessibility are inadequate or

lead to travel challenges in some areas of Tahoe.

- **Adequacy of transportation conditions –** The lack of sidewalk clearing in the winter and limited number of crosswalks can create travel and safety challenges.

The ATP incorporates the challenges identified in the Transportation Equity Study and proposes projects that address them.

Community Outreach Highlights:

- Staff reached hundreds of people at multiple tabling events from April to September 2023 such as farmers' markets, Bike Kitchens, and other events around the basin, while staff received 279 webmap response for location specific feedback.

- Participants identified a host of improvements to our bicycle and pedestrian network, particularly closing connectivity gaps that limit the ability to get from one destination to another, safer crossings and access for pedestrians and disabled folks, as well as providing safe, low stress on-street facilities for cyclists as the top priorities for active transportation planning.

Photo: Ryan Murray

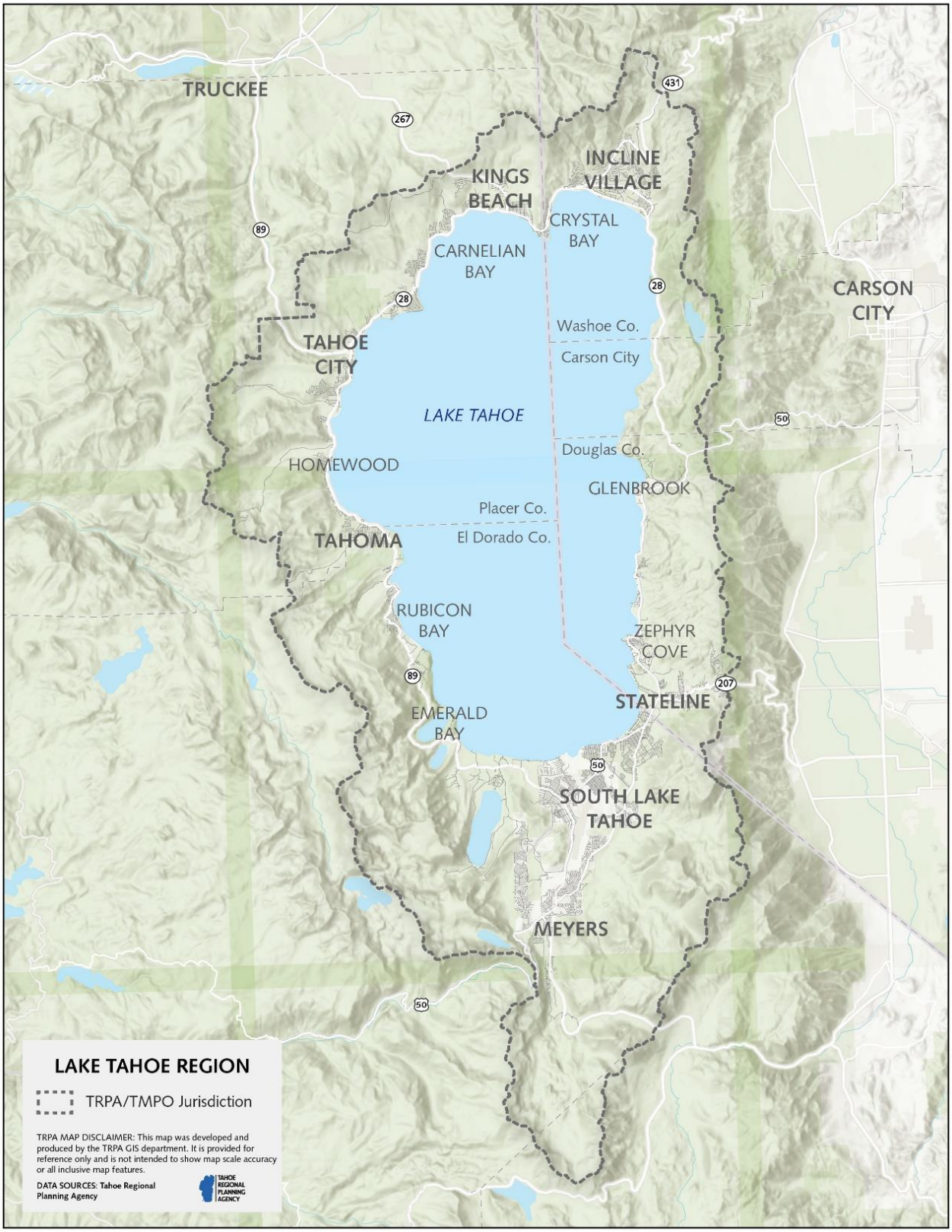
1.2 STUDY AREA

The Lake Tahoe Region is located on the California-Nevada border between the Sierra Nevada Crest and the Carson Range. Approximately two-thirds of the Region is in California and one-third is in Nevada. In total, the region comprises about 501 square miles including the waters of Lake Tahoe, which measures 191 square miles. Lake Tahoe is the dominant natural feature of the region and is the primary focus of local environmental regulation seeking to protect and restore its exceptional water clarity. The region contains the incorporated area of the City of South Lake Tahoe and portions of El Dorado County and Placer County in California, and Washoe and Douglas counties and the rural area of Carson City in Nevada. It is situated within the Fourth Congressional District of California and the Second Congressional District of Nevada. TRPA is a separate legal entity governed by a body of seven voting delegates from California and seven voting delegates from Nevada. There is also a non-voting federal representative to the Governing Board. TRPA Board, with the addition of a representative from the U.S. Forest Service, serves as the Tahoe Metropolitan Planning Organization Board. In the State of California, TRPA serves as the Regional Transportation Planning Agency.

View from Castle Rock. Photo: Tom Lotshaw

Most of the area can be characterized as rolling to mountainous terrain with limited areas of level terrain along the North and South shores of the lake. Approximately 90 percent of the land in the region is publicly owned: 78 percent is managed by the U.S. Forest Service and the balance by state and local agencies. These areas are rural compact towns and are in lands predominantly protected for open space or natural resource.

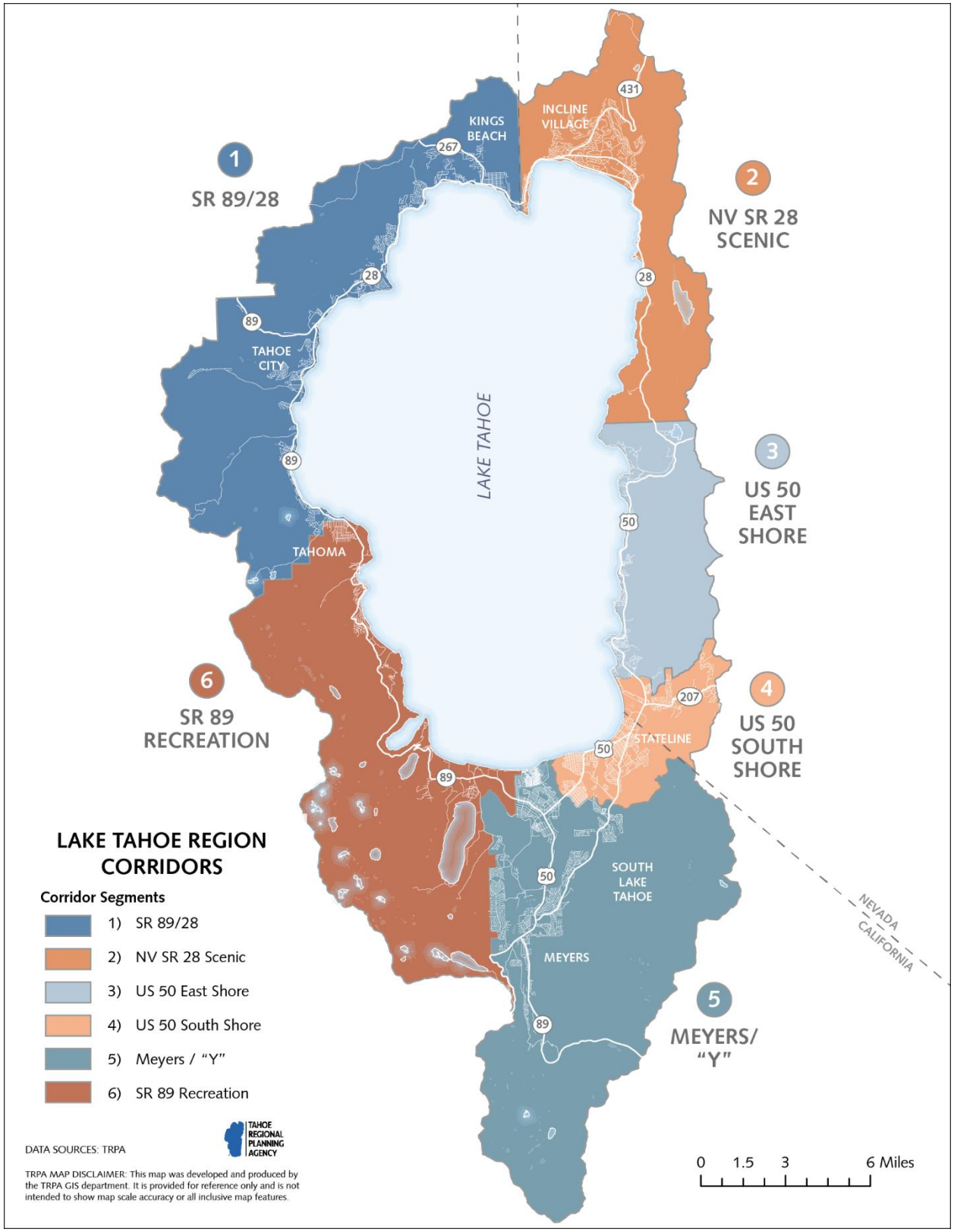
FIGURE 1-1: LAKE TAHOE REGION MAP



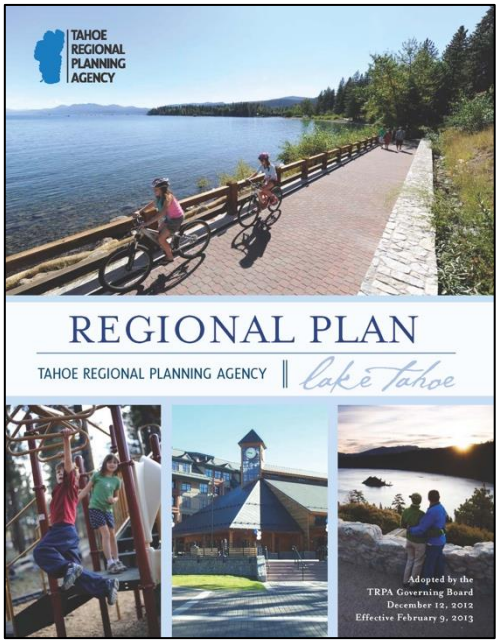
Corridor Connection Planning

As part of developing the Regional Transportation Plan, TRPA partners with agencies such as the U.S. Forest Service, State Parks, the state DOTs and the Tahoe Transportation District (TTD) to conduct corridor planning. Agencies throughout the region and the public are participating in the corridor planning process to create holistic projects that serve all current and future users of the transportation system. Corridor plans are ongoing around the lake and play an important role in improving active transportation. The eight individual corridor plans (encompassing six corridors around the lake plus two inter-regional entry corridors) will address multi-modal transportation solutions, environmental improvement, safety for all roadway users, support for economic vitality, quality of life, and accelerated delivery of projects and services. Some examples of the specific concerns that corridor plans aim to address are peak-period congestion, inadequate transit service, active transportation and vehicle conflict, lack of funding for infrastructure and maintenance and insufficient safe, environmentally responsible parking. Figure 1-2 illustrates the six corridors within the region. This plan uses the corridor connection plan framework for organizing data and illustrating existing and proposed infrastructure.

FIGURE 1-2: LAKE TAHOE REGIONAL CORRIDORS



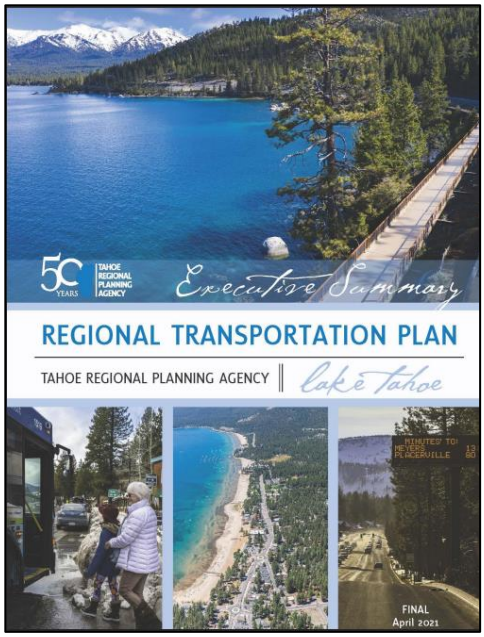
Agency Roles & Responsibilities


TAHOE REGIONAL PLANNING AGENCY
REGIONAL PLAN
TAHOE REGIONAL PLANNING AGENCY | lake Tahoe
Adopted by the TRPA Governing Board December 12, 2012 Effective February 9, 2013

Implementation of the Active Transportation Plan is a multi-agency collaboration, and the plan fulfills multiple agency requirements. As the TMPO document, the plan is incorporated by reference into TRPA's Regional Transportation Plan and meets federal and state requirements for active transportation planning. The Active Transportation Plan is also part of TRPA's Regional Plan. Projects listed in the plan are eligible for federal, state, and local grants. To apply for these grants, in most cases local jurisdictions will need to formally adopt the plan via a resolution. Adoption should take place shortly after the plan is approved by the TMPO branch of the TRPA Board.

The primary responsibility for construction and maintenance of the active transportation network lies with local jurisdictions, including the counties, the City of South Lake Tahoe, public utility districts, state transportation agencies, regional transportation districts, and public lands agencies. Private developers also play an important role in implementation of the network by providing easements and constructing and maintaining segments that are adjacent to their property.

Input from the public, advocacy community, and other associations are also an essential part of project implementation. The content within this plan is intended to assist and guide the project implementation process.



TRPA's primary role as the TMPO is to carry out the goals and policies located herein and to support our regional partners in the implementation of the identified priority projects. TRPA will have an active role in the implementation of certain policies, such as working with private developers to accommodate active transportation into their project plans. Other policies note the importance of annual monitoring and reporting on plan implementation and provide data for regional project analysis. Finally, there are many instances where TRPA will have an advisory role, providing technical assistance through collaborating with partnering agencies to encourage best-practice design and the implementation of projects and programs that support the realization of a complete transportation network.

TABLE 1-1: AGENCIES & RESPONSIBILITIES

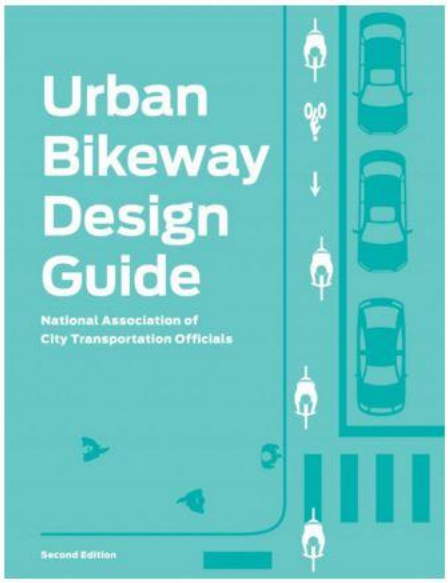
AGENCY TYPE	AGENCY	RESPONSIBILITY				
		Planning	Design	Construction	Maintenance	Funding
FEDERAL	U.S. Forest Service	X	X	X	X	X
	Federal Lands	X	X	X		X
STATE	Caltrans	X	X	X	X	X
	Nevada Department of Transportation (NDOT)	X	X	X	X	X
	California Tahoe Conservancy (CTC)	X			X	X
	California State Parks	X	X	X	X	X
	Nevada State Parks	X	X	X	X	X
LOCAL JURISDICTION	Counties	X	X	X	X	X
	City of South Lake Tahoe	X	X	X	X	X
PUBLIC UTILITY DISTRICTS	North Tahoe Public Utility District (NTPUD)			X	X	X
	Tahoe City Public Utility District (TCPUD)	X	X	X	X	X
REGIONAL TRANS. DISTRICT	Tahoe Transportation District (TTD)	X	X	X	X	X
METRO-PLANNING ORG.	Tahoe Regional Planning Agency / Tahoe Metropolitan Planning Organization (TRPA/TMPO)	X				X

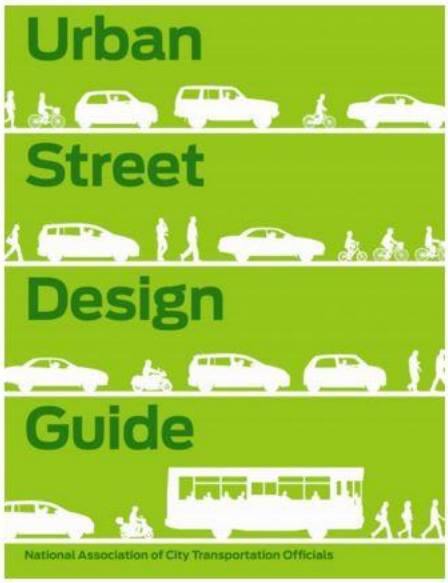
Associated Plans, Policies, & Codes

To ensure this plan meets all requirements and is consistent with other planning efforts, staff reviewed and incorporated relevant plans, policy documents, and codes. Described below are some of the most often cited documents that affect active transportation planning.

FEDERAL:

Manual on Uniform Traffic Control Devices (MUTCD) defines standards used by road managers nationwide to install and maintain streets, highways, bikeways, and private roads open to public travel. The Federal MUTCD is published by the Federal Highway Administration (FHWA). The most current MUTCD is the 11th addition, adopted December 19, 2023. The new MUTCD is purported to have much more robust design standards on approved traffic control devices for pedestrian and bicycle facilities. As with previous renditions of the MUTCD, the FHWA supports design flexibility through referring planners and engineers to guides published by the American Association of State Highway and Transportation Officials, the National Association of City Transportation Officials, and the Institute of Transportation Engineers.





STATE - *California:*

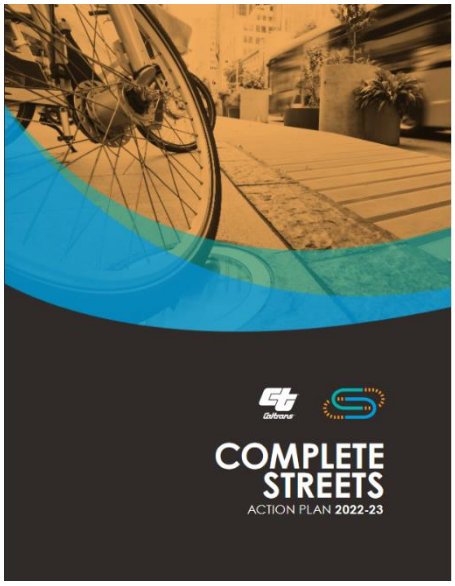
California Active Transportation Program (California ATP), signed by Governor Brown in 2013, consolidates existing federal and state transportation programs, including the TAP, Bicycle Transportation Account, and State Safe Routes to Schools, into a single program with a focus to make California a national leader in active transportation. The California ATP is administered by the California Department of Transportation Division of Local Assistance, Office of Active Transportation and Special Programs. The program offers grant funds for projects that:

- Increase the proportion of trips accomplished by biking and walking,
- Increase safety and mobility for non-motorized users,
- Advance the active transportation efforts of regional agencies to achieve greenhouse gas (GHG) reduction goals,
- Enhance public health,
- Ensure that disadvantaged communities fully share in the benefits of the program, and
- Provide a broad spectrum of projects to benefit many types of active transportation users.

Director's Policy DP-37, made effective December 2021 directs Caltrans to implement complete streets in all its funded transportation projects.

"…all transportation projects funded or overseen by Caltrans will provide comfortable, convenient, and connected complete streets facilities for people walking, biking, and taking transit or passenger rail unless an exception is documented and approved."

To continue to support this directive, Caltrans published the District 3 Active Transportation Plan in 2022 and their Complete Streets Action Plan in 2022-23. The goals stated in the Caltrans plans are to reduce dependency on single-occupancy vehicles, facilitate safe travel for all users, work towards Vision Zero measures, promote equitable solutions, and address long term maintenance needs.

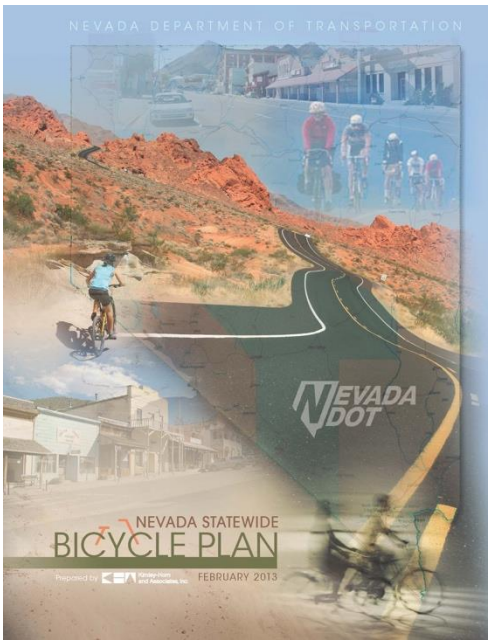


California Highway Design Manual, Chapter 1000: Bikeway Planning and Design, 7th Edition was revised in September 2023. This manual, along with the California MUTCD, identifies specific design and signage standards for active transportation facilities. Design Information Bulletins should also be reviewed during project design.

2014 Caltrans Memorandum "Design Flexibility in Multi-Modal Design" provides for flexibility in design through experimental project processes. The memo identifies design documents such as the National Association of City Transportation Officials' "Urban Street Design Guide," "Urban Bikeway Design Guide," and the Institute of Transportation Engineers' "Designing Urban Walkable Thoroughfares" as important resources when considering designs that accommodate all users.

STATE - *Nevada:*

The Nevada Statewide Bicycle Plan, published in February 2013, includes policies, standards, and performance measures to increase active transportation use and improve safety through its "Zero Fatalities" initiative. All design recommendations in the Nevada Statewide Bicycle Plan utilize federal standards found in the MUTCD.



Nevada Strategic Highway Safety Plan (SHSP), revised in February 2021, was developed to save lives by addressing the frequency, rate, and primary factors contributing to fatal and severe injury crashes in Nevada. The plan identifies four critical emphasis areas, including incorporating equity, prioritizing safe speed, "double down" on what is working, and accelerating advanced technology. Focusing on the statistically most dangerous intersections and roadway segments is the main driver behind these four areas of emphasis. The plan also focuses on the 6 "E's" of traffic safety: Equity, Engineering, Education, Enforcement, Emergency Response and Everyone. The strategy seeks to utilize its core principles to align with the Road to Zero Coalition's initiatives to achieve the goal of zero roadway fatalities by the year 2050.

REGIONAL:

Tahoe Regional Planning Agency Bi-State Compact

Article I(b) of the compact established TRPA's responsibility to establish environmental threshold carrying capacities. TRPA adopted thresholds for the Region in Resolution 82-11 in 1982. The thresholds cover various environmental components of the Tahoe Region, including air and water quality standards that are linked to transportation.

In addition, the Compact states that the goal of transportation planning shall be:

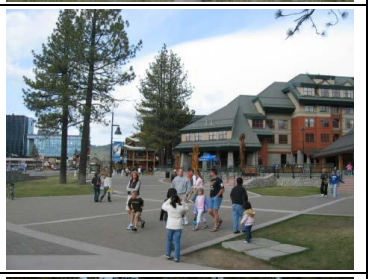
a) To reduce dependency on the automobile by making more effective use of existing transportation modes and of public transit to move people and goods within the region.

b) To reduce to the extent feasible air pollution which is caused by motor vehicles.

TRPA Regional Plan & the 2020 Regional Transportation Plan contains general transportation goals and policies, many of which relate to active transportation. These are the backbone of the more specific goals, policies, actions, and performance measures found in the ATP.

The TRPA Code of Ordinances implements TRPA's policies by informing public and private project permitting. Relevant transportation code sections include:

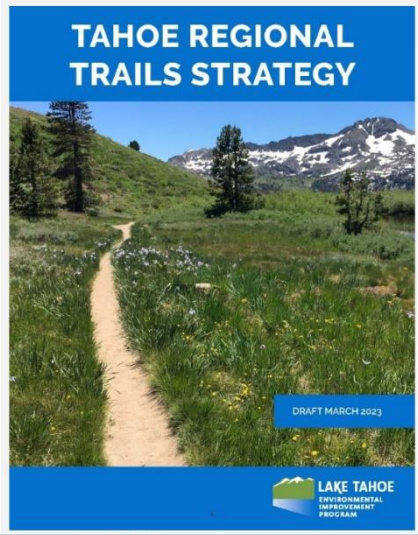
Transportation Code Affecting Bicycle and Pedestrian Facilities
August 21, 2013

Code Description	Section	
Bicycle Path Coverage Waiver *	30.4.6.D.3	
Accommodation of Bicycle and Pedestrian Facilities in Projects	65.3	
Bicycle and Pedestrian Facility Maintenance Plan	36.5.5	
Traffic and Air Quality Mitigation Program	65.2	
Vehicle Level of Service Exemption	Policy T-10.7	

*Code section 30.4.6.D.3 is currently not recognized by Lahontan Regional Water Quality Control Board.

Tahoe Regional Trails Strategy

TRPA collaborated with local partners to develop the region's first ever Tahoe Regional Trails Strategy in 2023. It outlines preliminary priorities and implementation strategies for Lake Tahoe's recreational trails over the next 15 years. The strategy leaves implementation decisions of any singular project in the hands of land managers and trail stewards. The strategy was led by TRPA staff in conjunction with the Washoe Tribe of Nevada and California, the USDA Forest Service Lake Tahoe Basin Management Unit, Tahoe Area Mountain Biking Association, Tahoe Fund, Tahoe Rim Trail Association, California State Parks, Nevada State Parks, California Tahoe Conservancy, and Achieve Tahoe. The team crafted the strategy with the goal of planning trails to be environmentally sustainable, equitable, connected, enjoyable, and feasible. The strategy is a living document and acknowledges that priority projects could change over time. Following completion of the strategy, the strategy development team formed a recreational trails working group within the Environmental Improvement Program (EIP) to regularly discuss regional trail priorities and to make funding decisions.

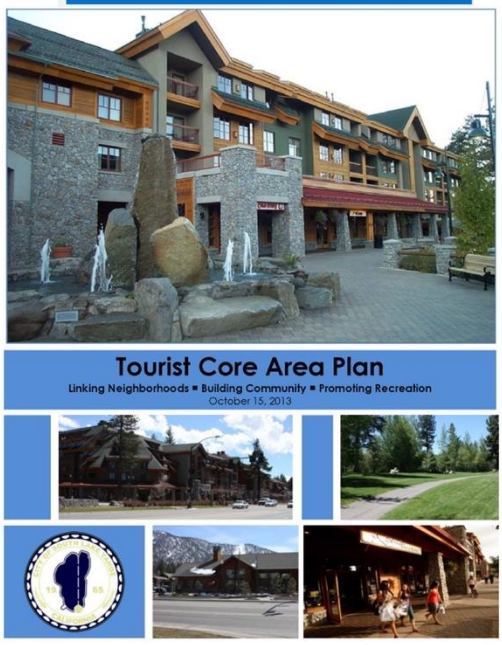


While Tahoe's dirt trails and their proposed amenities are the focus of the Trails Strategy, connections to Tahoe's existing and proposed active transportation network were heavily considered in making the recommendations laid out within the strategy. The document does not provide specific recommendations for paved paths, as this plan does, but ensures that trailheads should have adequate bicycle parking, and provide access to and from low-stress active transportation facilities that connect users to these popular recreation destinations without a car.

LOCAL:

Plans for Specific Geographic Areas within the Region

After adoption of the 1987 Regional Plan, over 170 different plans were adopted for certain geographic areas. These include plan area statements, community plans, and other detailed specific or master plans. With adoption of the 2012 Regional Plan, local, state, federal, and tribal governments are encouraged to adopt area plans to supersede the older plans. Area plans must be found in conformance with the Regional Plan. Some examples of adopted local area plans include the *2013 Tourist Core Area Plan* and *Tahoe Valley Area Plan* for the City of South Lake Tahoe and the 2013 Douglas County *South Shore Area Plan,* that are frequently updated.



1.3 BENEFITS OF ACTIVE TRANSPORTATION

Active transportation provides multiple benefits to Lake Tahoe communities by reducing air pollution and traffic congestion, meeting greenhouse gas reduction targets, and improving the local economy and public health. Beyond these tangible benefits, biking and walking are pleasurable and relaxing outdoor activities that residents and visitors seek out and enjoy. Additionally, at least 30 percent of Lake Tahoe's residential population are considered transportation disadvantaged and are more likely to rely on biking or walking as their primary form of transportation. Increasing active transportation is critical for meeting TRPA goals of attaining environmental thresholds and reducing dependency on the private automobile. To help quantify the benefits of active transportation, TRPA compiled data from national and global research.

Environmental Benefits:

NV Stateline to Stateline Bikeway. Photo: Mike Vollmer

Bicycle and pedestrian facilities have positive impacts on multiple environmental threshold areas including air quality, water quality, soil, wildlife, and recreation. It is no secret that supporting walking, bicycling, and rolling as viable means of transportation have direct positive impacts on reducing greenhouse gas emissions, as well as having positive public health outcomes.

According to the United States Environmental Protection Agency, the transportation sector accounted for the largest share of greenhouse gas emissions (28%) in the United States in 2018. Light-duty vehicles, which include passenger vehicles and light-duty trucks, account for the majority of transportation sector

emissions at 59%. Vehicle emissions are determined by fuel efficiency, carbon content of fuel, and vehicle miles traveled[3].

Supporting active modes of transportation and reducing our reliance on the automobile are critical to TRPA environmental goals.

Equity Benefits:

Multi-modal infrastructure provides transportation options for those who cannot afford a car or are unable to drive due to age or disability. Typically, large portions of the population are unable to drive due to a variety of reasons. The following priority communities are considered transportation disadvantaged and are more likely to walk, bike, roll, or take transit according to the Transportation Equity Study:

- **Persons without private transportation (zero vehicle households):** Lack of a personal vehicle is a significant factor for transit or active transportation use. In 2022, 80 percent of Tahoe transit riders did not have access to a personal vehicle.
- **Seniors (individuals 65 years and older):** Elderly individuals may choose not to drive or can no longer drive to due to age-related health issues. Accessible and convenient transportation is crucial to maintaining their independence, accessing healthcare, and participating in community activities.
- **Persons living below the poverty line:** Purchasing and maintaining a personal vehicle might be difficult for households with limited income, making them dependent on transit or active transportation modes.
- **Individuals with a disability:** Disability status may impact an individual's ability to live independently, including driving a personal vehicle. Lack of wheelchair accessibility, limited sensory aids, or other accommodations can contribute to transportation challenges.
- **Youth (individuals under 18 years old):** Most people under 18 do not drive and even those with driver's licenses often do not have the means to purchase or maintain a personal vehicle.
- **BIPOC (Black, Indigenous, and People of Color):** People of color are more likely to live in densely populated areas, are less likely to have access to a car, and are more likely to bike, walk, and use public transportation to commute to work.

[3] https://www.pedbikeinfo.org/factsfigures/facts_environment.cfm

Table 1-2 below shows the demographic breakdown of these identified priority communities within the Lake Tahoe Region:

Table 1-2 Tahoe Transportation Demographics

Priority Community	Population	Percent (%) of Total
Zero vehicle households (ZVH)*	845	3.61%
Seniors (individuals 65 years and older)	10,981	19.67%
Persons living below the poverty line*	5,037	9.34%
Households living below the poverty line*	2,114	9.03%
Working-age individuals with a disability*	2,833	8.38%
Youth (individuals under 18 years old)	9,658	17.30%
BIPOC (Black, Indigenous, and People of Color)	17,246	30.89%
TOTAL Lake Tahoe Population (2020 Census)	55,836	
TOTAL Lake Tahoe Households (2020 Census)	22,413	

*Calculated using 2021 American Community Survey Estimates

Improving multi-modal infrastructure provides transportation options for those that depend on its safety and functionality while also serving those who prefer to use active modes by choice. Lake Tahoe residents primarily travel by car (84 percent), however, 58 percent of survey respondents noted they would prefer to travel by foot, bike, or transit.

Figure 1-3 Primary Mode of Transportation

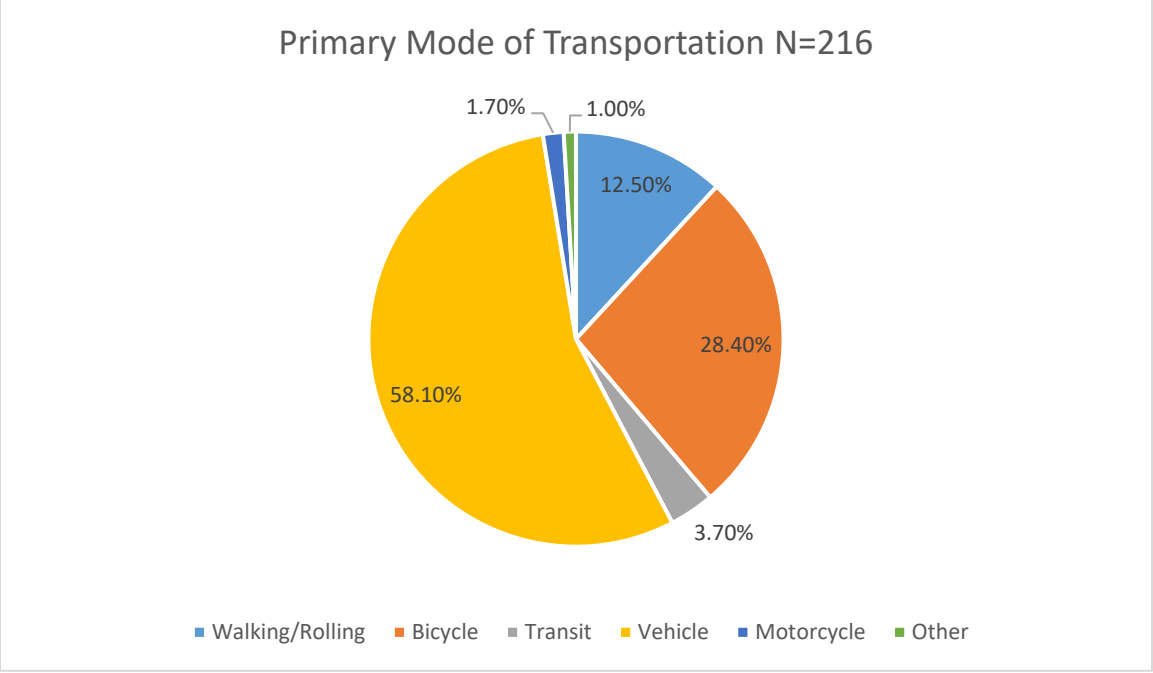


Figure 1-33: Primary Mode of Transportation. Source: Tahoe Transportation Survey

Economic Benefits:

Bicycle and pedestrian facilities provide many economic benefits including increased direct expenditures at local businesses, increased property values and employment opportunities, and personal savings from reduced vehicle use (or the need to own a car at all). Increases in transportation efficiency through multi-modal options also reduce costs related to roadway rehabilitation, support facility needs and potential property damage due to vehicle collisions.

Safe and convenient bicycle infrastructure increases the draw of the region to visitors and residents, encouraging those interested in living a recreational and healthy lifestyle to extend their stay and spend more money. Approximately 13 percent of visitors surveyed in a North Carolina Northern Outer Banks study stated that their average visit duration was three to four days longer due to the excellent bicycling opportunities.[4]

Catering to these characteristics in visitors is a focus for many businesses, organizations, and agencies in the region. Media campaigns recognize the economic benefit to businesses by attracting active, health-minded people to Lake Tahoe.

Harrison Avenue. Photo: Tom Lotshaw

[4] Lawrie, 2004

National research on the connection between active transportation users and high direct expenditures continues to grow. A study in Portland, Oregon illustrated that customers who frequent businesses by bicycle spend $10 more per month than customers who arrive by vehicle. This also held true across multiple studies, both national and international. Many countries, such as Canada, Germany, Switzerland, and the United States support this research, showing that though active transport users often buy less per visit to restaurants, bars, and convenience stores, they typically frequent businesses more often, giving them more opportunities to purchase items that may not be on the shopping list.[5] A survey conducted in Bern, Switzerland indicates businesses profited almost $2,000 more per square meter of bicycle parking than vehicle parking. [6]

East Shore Kayakers. Photo: Mike Vollmer

Employment opportunities increase when multi-modal transportation is accessible and offered as a convenient method of travel. Lower-income people who depend on public transportation systems are more able to access educational and employment opportunities. This increases the quality and quantity of the low wage labor pool for service-oriented industries, which is the predominant employment in Lake Tahoe.

From increasing retail visibility to raising real estate value, the economic impact of active transportation on a community can take many forms. Studies across various U.S. cities by the Urban Land Institute find houses located in areas with above-average walkability or bike-ability are worth up to $34,000 more than similar homes in areas where those features are average. As for businesses, people who arrive by bicycle have been shown to spend more overall while making more frequent visits. There are other personal user economic benefits of active transportation such as job creation and overall savings from fuel consumption, car payments, maintenance, parking, and car storage. Savings from these sources can free up discretionary income and allow both residents and visitors to spend more in Lake Tahoe communities.[7]

[5] Angus, 2023
[6] Szczepanski, 2013
[7] FHWA, 2015

Health Benefits:

Increasingly, the health benefits related to active transportation are being recognized by health professionals, urban planners, and policy makers. Funding opportunities for active transportation are tied to how projects illustrate production of health benefits for community members, such decreasing adult and youth obesity and blood pressure. Federal and state policies seek to increase physical activity not only for direct health benefits to constituents, but also because healthier people produce cost savings and reduce strain on the health care system. Annual per capita health cost savings from physical activity have been found to vary between $19 and $1,175, with a median value of $128.[8]

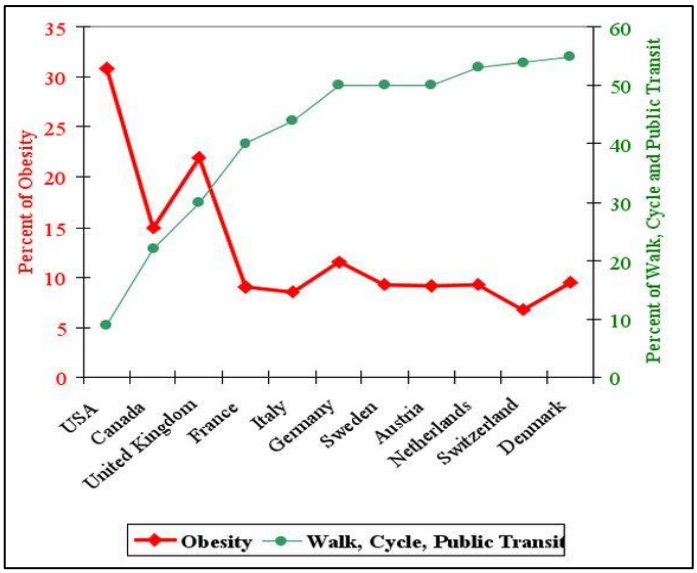


Figure 1-4-4: Obesity vs. Activity. Source: Bassett et al

Reliance on the automobile, often due to the layout of the built environment, has led to a lack of physical activity in the United States. Multiple studies indicate that areas with unconnected, "sprawl" land-use patterns and low multi-modal transportation have the highest obesity rates (Figure 1-4).

Other issues related to inadequate physical activity can include heart disease, diabetes, osteoporosis, dementia, and mental health. The 2012 Barton Community Health Needs Assessment prioritizes mental health and dementia as two priority focus areas for South Lake Tahoe residents. There is research that indicates consistent walking and biking reduces appearance of dementia and long-term cognitive decline.[9] Additionally, exercise, social interaction, and sunlight have been identified as the most effective treatment for mental illness, particularly depression.[10] In general, a sense of higher overall well-being has also been connected to the amount of time people spend in active transport in comparison to time in vehicle transport.[11]

The U.S. Center for Disease Control (CDC) recommends 22 minutes of moderate physical activity per day for adults. Active transportation is one of the most effective ways to achieve this goal. That is why the CDC has instituted the Healthy People 2020 program focusing on promoting walking and biking. In South Lake Tahoe, roughly 58 percent of residents consistently meet the recommended physical activity levels, which is above national and state averages.[12] This percentage illustrates the importance of physical

[8] TRPA, 2009.
[9] Litman, 2015.
[10] Owen, 2015
[11] Litman, 2015.
[12] Barton Health, 2012

activity to Lake Tahoe residents. Offering infrastructure that provides opportunities for increased biking and walking can be considered a critical element of meeting physical activity goals.

Enhanced Quality of Life

One goal in the Regional Transportation Plan is to support a region that offers the ability to walk, work, and play within our communities. Tahoe residents have called for walkable, mixed-use town centers with reliable and convenient public transit, and streets that encourage biking and walking. A balanced transportation system can help provide a unique identity and a sense of "place" in each community. These goals are supported by recent reports and studies. A report by The National Association of Realtors found that there has been a 25 percent increase in walking to destinations since 2001. The association also found that millennials prefer walking to driving by 12 percent, and prefer short, active transport commutes to work and recreation.[13]

"Mountain Beach Loop"
Created by Design Workshop

[13] National Association of Realtors, 2015

CHAPTER 2: EXISTING CONDITIONS AND NEEDS ANALYSIS

This chapter details the existing state of bicycle and pedestrian infrastructure in Lake Tahoe, discusses how the existing transportation network functions, and makes recommendations for improved infrastructure. High-use routes are shown through qualitative and quantitative data. Future use is estimated based on the Bike Trail User Model. This chapter also identifies common barriers to active transportation found throughout the Lake Tahoe Region. The plan offers strategies to create a convenient and safe network for bicycling and walking.

2.1 EXISTING CONDITIONS

In Lake Tahoe, the active transportation network serves many purposes. Infrastructure such as shared-use paths, bike lanes, and sidewalks are both recreational resources and year-round transportation modes for a recreation-based economy. While recreation as a destination activity is an important component of our active transportation network, The Regional Transportation Plan models that recreation may only account for half of all active transportation related trips. This plan highlights the importance of improving utility trips, such as trips to the grocery store, medical appointments, school, work, or other trips that may serve residents' day-to-day needs while also providing low-stress active transportation facilities to recreation destinations such as beaches and trailheads. When planning and designing projects, implementers must consider the needs of different user groups beyond auto drivers and how they *intuitively interact* with existing land-uses. Some important questions to consider are:

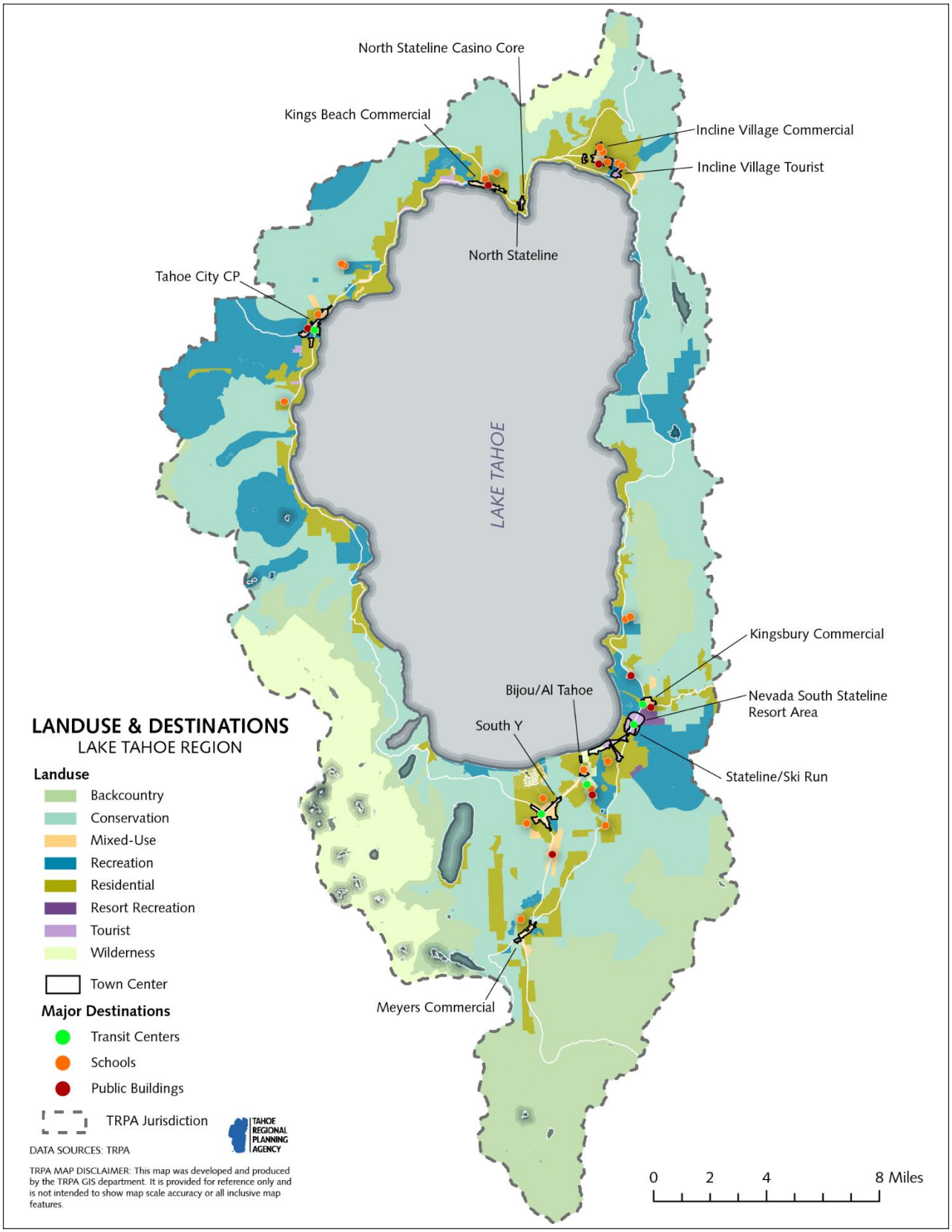
- Where do people want to go?
- Which way are people going already, even without existing facilities?
- How are implementers supporting low-stress walking, biking, and rolling, particularly as compared to existing auto-centric land use?
- Is the utility of the network viable, or are there gaps in the network?

Common Infrastructure & Users Found at Lake Tahoe

The Lake Tahoe Region weaves a variety of infrastructure types together to create its active transportation network. To get from origin to destination, a bicyclist may take a bike route to a shared-use path to a bike lane. In many locations no designated active transportation infrastructure is present. Existing land-use, such as retail, restaurants, homes, services, and recreation destinations dictate where people want to go. The type of infrastructure available and its level of stress prescribes, in part, how people will choose to get to their destinations. Figure 2-1 illustrates the locations of town centers and where the opportunity for low-stress active transportation infrastructure could have the highest impact of what mode people select to travel.

Mid-block crossing without infrastructure. Photo: Mike Vollmer

FIGURE 2-1: REGIONAL LAND USE AND TOWN CENTERS



The main types of bicycle and pedestrian infrastructure currently in place in the Lake Tahoe Region are described below.

- **Shared-Use Path (Class I)**

  A shared-use path is a completely separate trail from the road network for active transport users. The path is recommended to be 10 feet wide and provide for two-direction travel.

Bike Route Sharrows, Tahoe City.

- **Bike Lane (Class II)**

  Bike lanes are striped four to six feet wide lanes and provide one-way travel on a shared roadway with vehicles.

- **Bike Route (Class III)**

  A bike route (boulevard) is a shared roadway typically located on low-volume and low-speed streets. Signs and painted "sharrows" assist with wayfinding and show the preferred location of the biker within the roadway.

- **Sidewalk**

  Sidewalks are at least five feet wide and offer pedestrians a separated path of travel along the street, reducing the conflicts between cyclists/scooter riders and pedestrians.

- **Marked Crosswalk**

  Painted markings that span a roadway to indicate where pedestrians have the right of way. Crosswalks can be accompanied by traditional signals or stop signs.

- **Pedestrian-Activated Flashing Beacon**

  Lights, accompanied by signage, flash when activated by pedestrians when they want to cross a street. In California, and Nevada all cars are required to yield to pedestrians attempting to cross the street. Depending on the type of beacon (Pedestrian Hybrid (PHB) vs. Rectangular Rapid Flashing Beacon (RRFB)), cars are required to yield to cyclists when lights are flashing. Some driver education is required for compliance and signal understanding.

Pedestrian-Activated Beacon (Rectangular Rapid Flashing Beacon)

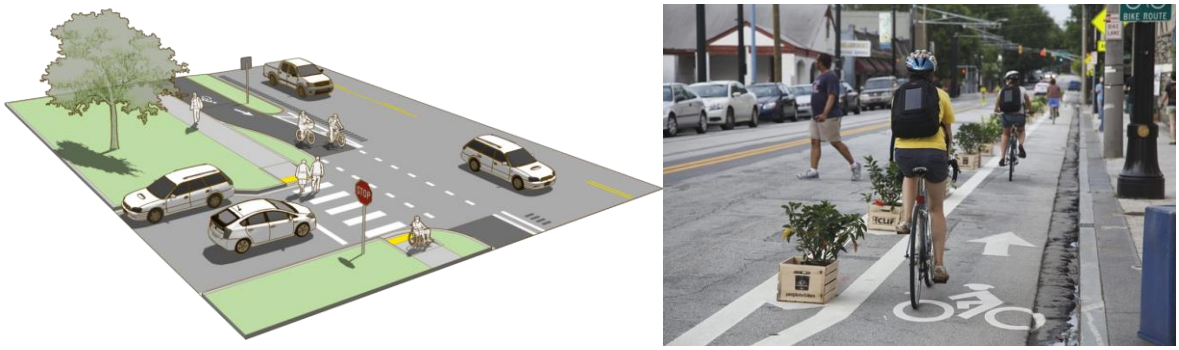
While TRPA and regional partners have made great progress in expanding the active transportation network over the years, there is more that can be done to support active transportation users. Below is a list of facilities that should be implemented to reduce the stress of the on-street network.

- **Class IIb Bike Lanes (Buffered Bike Lane)**

  Class IIb bike lanes, also referred to as a "buffered bike lane" is a striped bike lane, that also stripes a "buffer zone" that allows for more space and a greater sense of safety for the cyclists as they pedal alongside the travel lane. This buffer zone also allows extra space for faster cyclists to overtake or allows a cyclist to make emergency adjustments without having to veer into the travel lane. Buffer zones have also been shown to have a traffic calming effect on automobiles in the adjacent travel lanes.

- **Class IV Bike Lanes (Separated/Protected Bike Lane)**

  Class IV bike lanes are any on-street bike facility that is protected by vertical separation. This is ideally concrete infrastructure, but could be grade separation, other devices such as flex posts, inflexible posts, or on-street parking. Separated bikeways typically operate as a one-way bicycle facility in the same direction as auto travel but can be utilized as a two-way separated bikeway (cycletrack).



Two example images of Class IV (separated) bikeways. Source: Alta

Two example images of Class IIb (buffered) bike ways. Source: NACTO

Existing Network

A list of all existing projects can be found in Appendix H, *Existing & Proposed Project Lists.* Table 2-1 illustrates existing mileage by jurisdiction and class.

Table 2-1: Existing Facility Mileage. Source: TRPA

Jurisdiction	Path Class I	Bike Lane Class II	Bike Route Class III	Sidewalk	TOTAL
El Dorado County	16.8	10.7	0.6	0.1	**28.3**
City of South Lake Tahoe	10.4	13.9	8.5	16.4	**49.2**
Placer County	18.9	16.7	1.7	4.9	**42.2**
Douglas County	4.9	1.3	0.2	3.4	**9.8**
Carson City	0	0	0	0	**0**
Washoe County	10.0	3.7	0	4.1	**17.9**
TOTAL	**61.1**	**46.3**	**11.1**	**29.0**	**147.5**

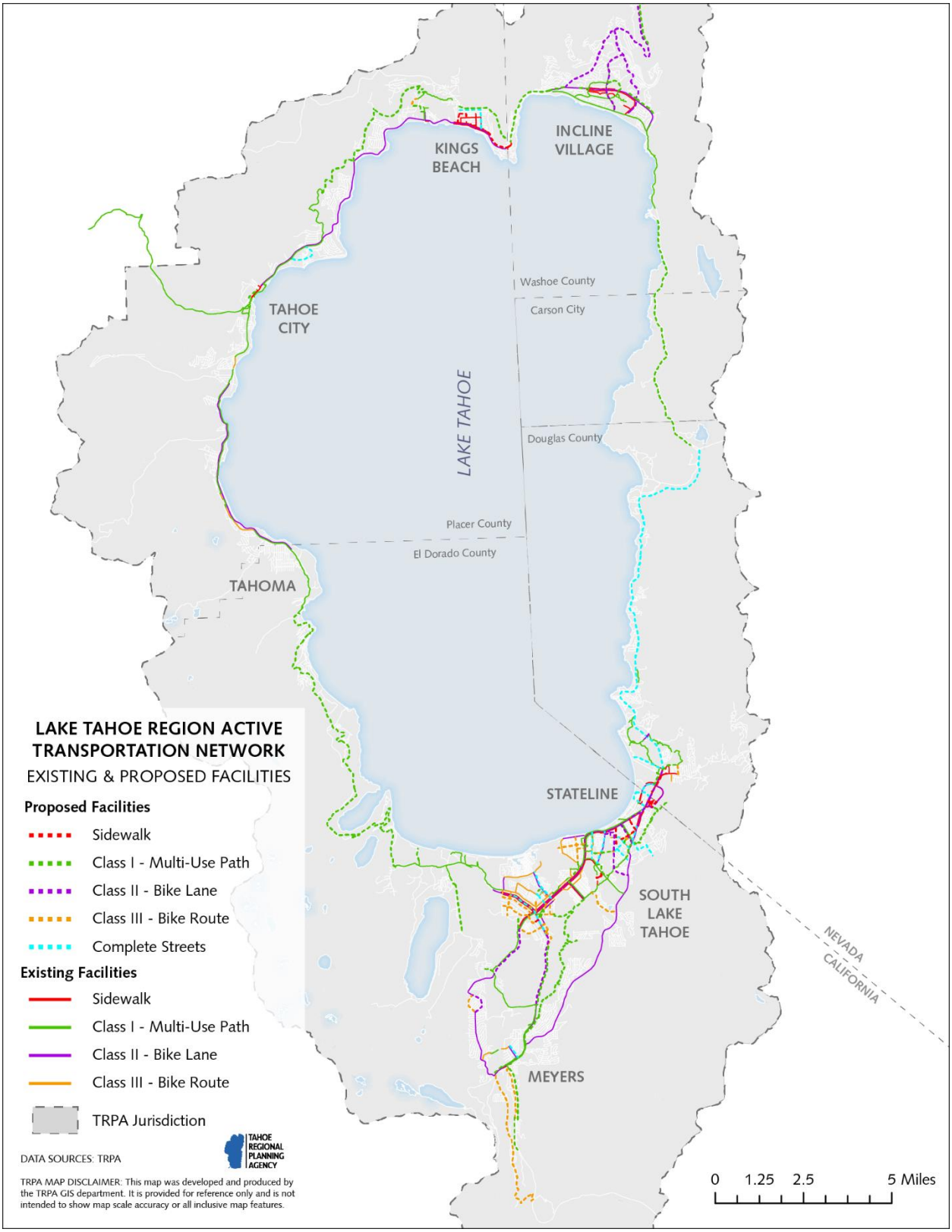
**El Dorado County sidewalk is roughly .06 miles.*

Table 2-2: Existing Bicycle and Safety Facilities. Source: TRPA

Jurisdiction	Enhanced Crossings (RFBS, HFBS, median islands, etc.)	Intersections with Marked Crosswalks	Bike Racks
El Dorado County	4	20	47
City of South Lake Tahoe	4	77	184
Placer County	4	77	137
Douglas County	2	26	29
Carson City	0	0	0
Washoe County	4	41	35
TOTAL	**18**	**241**	**432**

Viking Way and Lake Tahoe Boulevard. Photo: Mike

FIGURE 2-2: REGIONAL EXISTING & PROPOSED ACTIVE TRANSPORTATION NETWORK MAP



Map can be viewed at: www.trpa.gov/atp

The Four Types of Cyclists and Bicycle Level of Traffic Stress

A new analytical introduction to the Plan's update are the concepts summarized in the "Bicycle Levels of Traffic Stress", that correlate to the four generalized bicyclist typologies. Originally developed by Roger Geller at the City of Portland, the "Four Types of Bicyclists" are meant to guide efforts (in broad terms) of what certain members of the population may want from any particular bicycle facility. The four types of bicyclists are:

1. ***Strong and Fearless:*** This group is willing to ride a bicycle on any roadway regardless of traffic conditions. They are generally comfortable taking the lane and riding in a vehicular manner on major streets without designated bicycle facilities.

2. ***Enthused and Confident:*** This group consists of people riding bicycles who are confident riding in most roadway situations but prefer to have a designated facility. Comfortable riding on major streets with a bike lane.

3. ***Interested but Concerned:*** This group is more cautious and has some inclination towards bicycling, but are held back by concern over sharing the road with cars. Not very comfortable on major streets, even with a striped bike lane, and prefer separated pathways or low traffic neighborhood streets.

4. ***No Way, No How:*** This group comprises residents and visitors who simply are not interested at all in bicycling, may be physically unable, or don't know how to ride a bicycle and they are unlikely to adopt bicycling in any way.

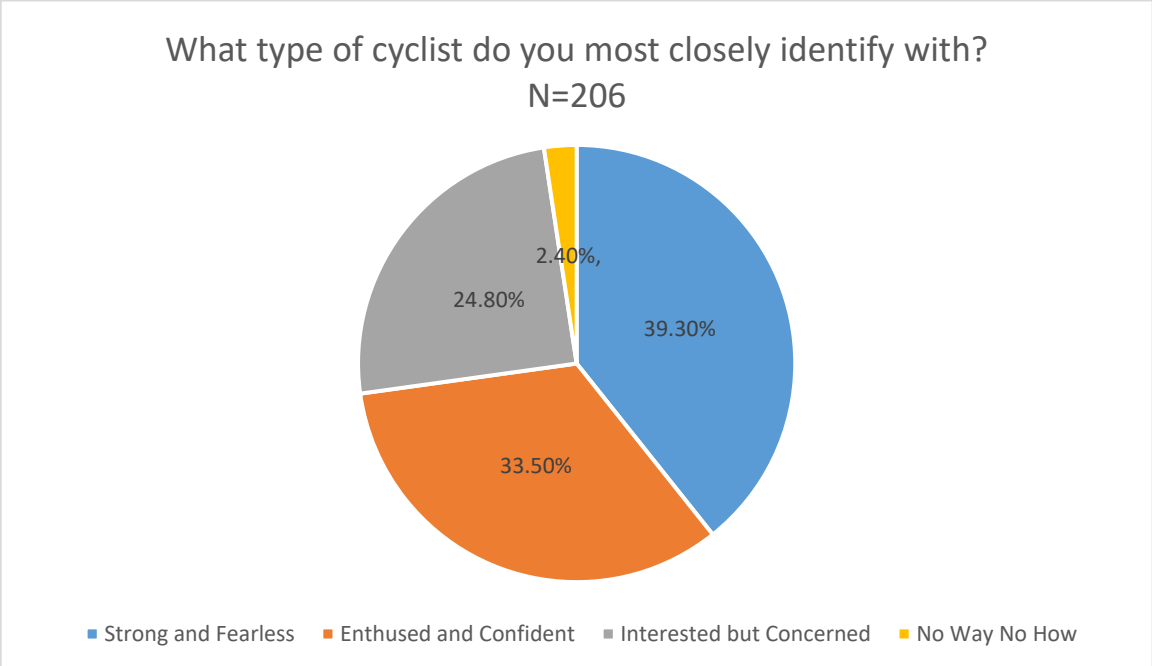
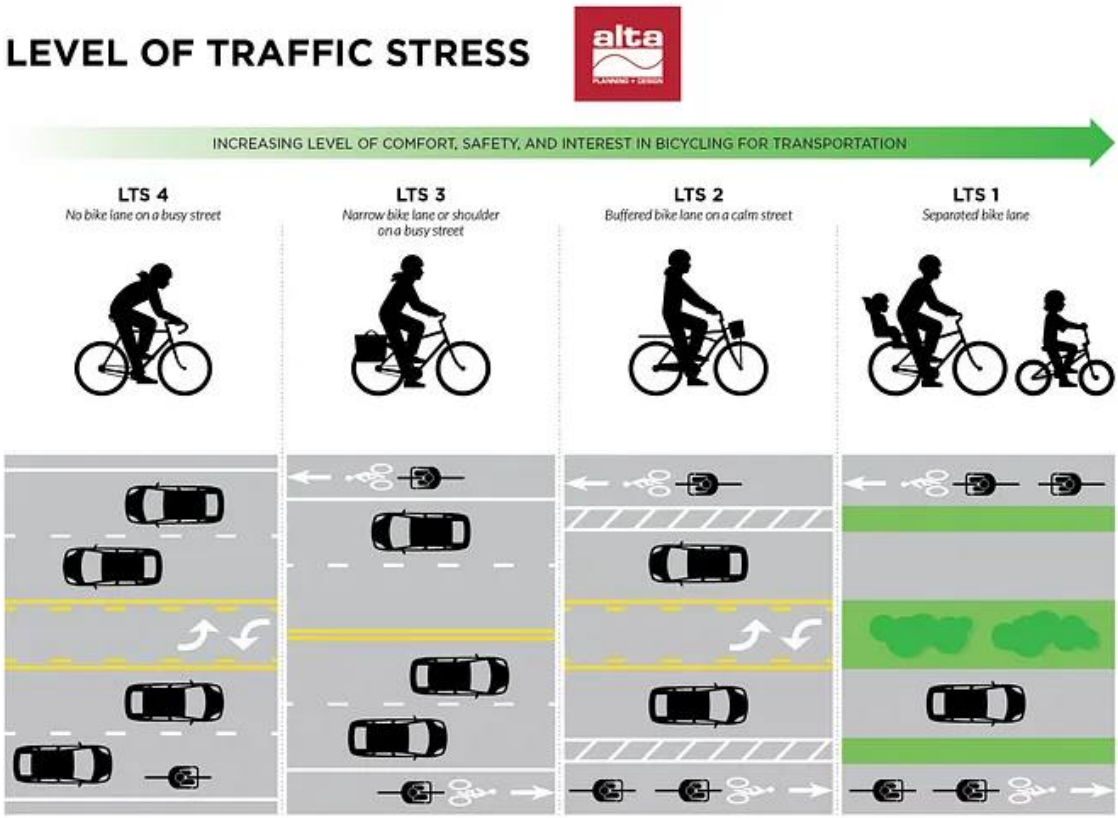


Figure 2-3 What type of Cyclist do you most closely identify with? Source 2023 Tahoe Transportation Survey

These informal category designations encourage engineers to design the roadway to meet the most vulnerable users' needs, thus capturing the largest amount of mode shift (switch from automobile to bicycle) as possible. People currently in the "No Way, No How" and "Interested but Concerned" categories, may currently choose to drive rather than walk or bicycle to a destination, however, if a high-quality (low-stress) facility was in place, these users may choose instead to walk or bicycle to their destination rather than drive, thus reducing the automotive impact on our transportation network. Furthermore, since the "Enthused and Confident" and "Strong and Fearless" categories are more willing to use our existing roadway network as is, the "share the road" option would still exist for those more confident. Thus, low-stress on-street bicycle facilities make our bicycling network more equitable for people who are most reticent to ride a bicycle as a means of transportation, while still supporting the needs of the most confident riders.


LEVEL OF TRAFFIC STRESS
alta
INCREASING LEVEL OF COMFORT, SAFETY, AND INTEREST IN BICYCLING FOR TRANSPORTATION
LTS 4
No bike lane on a busy street
LTS 3
Narrow bike lane or shoulder on a busy street
LTS 2
Buffered bike lane on a calm street
LTS 1
Separated bike lane

Example of the Four Types of Cyclists and the corresponding potential roadway features that contribute to Bicycle Levels of Traffic Stress. Image courtesy of Alta Planning and Design. Note: These roadway types serve as examples and are not always indicative of locations specific conditions.

What is Bicycle Level of Traffic Stress?

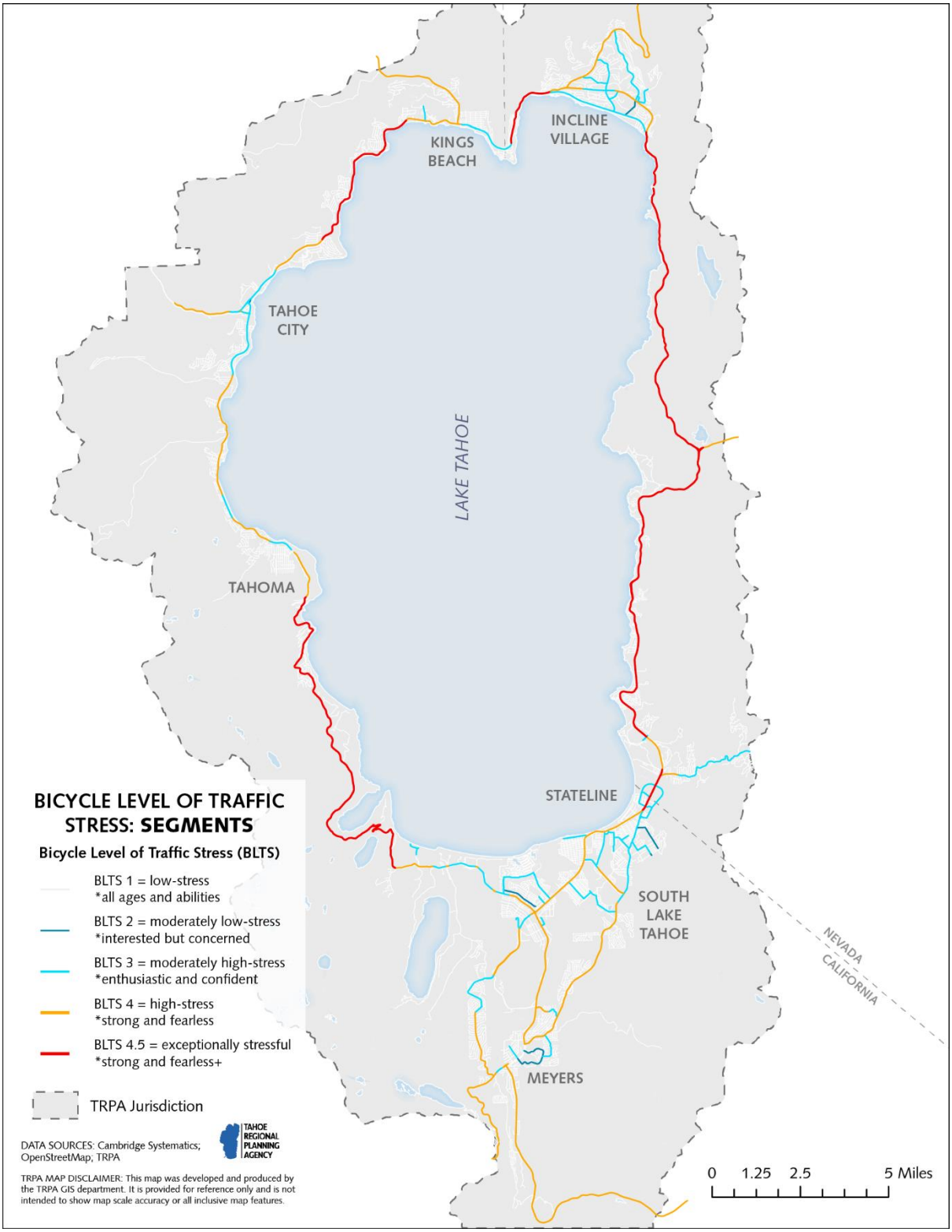
Building on the Four Types of Cyclists, a Bicycle Level of Traffic Stress (BLTS) analysis was conducted for the entire Tahoe Basin. Traffic stress is the perceived sense of danger associated with riding in or adjacent to vehicle traffic. Studies have shown that traffic stress is one of the greatest deterrents to bicycling.[1] The less stressful, and therefore more comfortable a bicycle facility is, the wider its appeal to a broader segment of the population. A bicycle network is likely to attract a larger portion of the population if it is designed to reduce stress associated with potential motor vehicle conflicts while still connecting people to where they want to go. A BLTS analysis is an objective, data-driven evaluation model which identifies streets with a high level of traffic stress, gaps in the bicycle network, and gaps between streets with low levels of traffic stress. More information on the BLTS analysis and methodology can be found in the technical memo published in Appendix C.

For a Tahoe specific analysis, more than 50 percent of respondents to the question "what type of cyclist do you most closely identify with" answered "interested but concerned" or "enthused and confident". This tells us that safe, low-stress (high-quality) bicycle infrastructure would capture the majority of riders, thus increasing bicycle mode share (as shown in figure 2-3). An online version of the BLTS map can be found at www.trpa.gov/atp.

Lake Tahoe Boulevard bike lane. Photo: Mike Vollmer

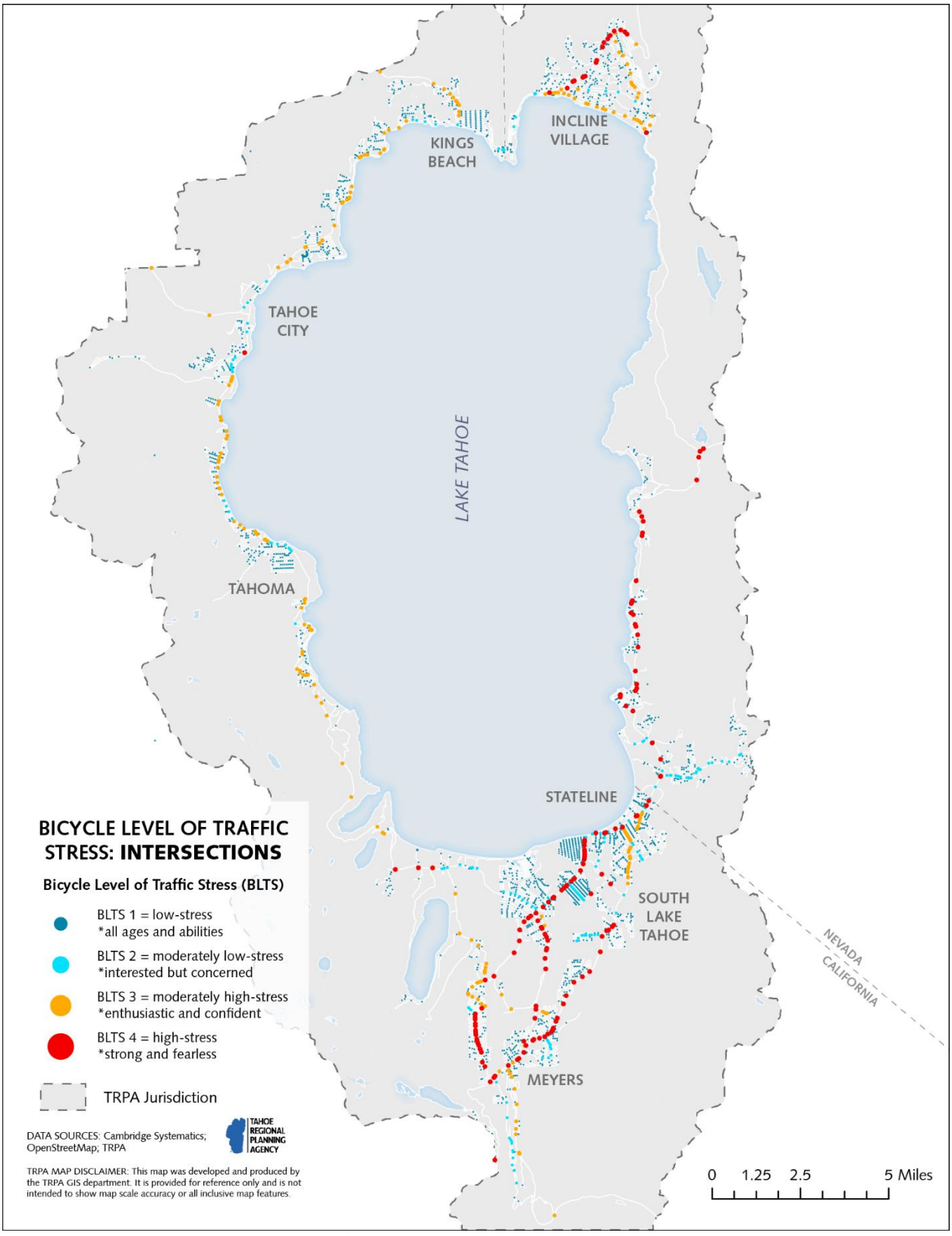
[1] M. Winters, G. Davidson, D.N. Kao and K. Teschke, "Motivators and deterrents of bicycling: comparing influences on decisions to ride", Transportation 38, 153-168 (2011).

FIGURE 2-4: REGIONAL BICYCLE LEVEL OF TRAFFIC STRESS ANALYSIS MAP (Segments)


KINGS BEACH
INCLINE VILLAGE
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
NEVADA
CALIFORNIA
MEYERS
BICYCLE LEVEL OF TRAFFIC STRESS: SEGMENTS
Bicycle Level of Traffic Stress (BLTS)
BLTS 1 = low-stress
*all ages and abilities
BLTS 2 = moderately low-stress
*interested but concerned
BLTS 3 = moderately high-stress
*enthusiastic and confident
BLTS 4 = high-stress
*strong and fearless
BLTS 4.5 = exceptionally stressful
*strong and fearless+
TRPA Jurisdiction
DATA SOURCES: Cambridge Systematics; OpenStreetMap; TRPA
TAHOE REGIONAL PLANNING AGENCY
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 1.25 2.5 5 Miles

Map can be veiwed at: www.trpa.gov/atp

FIGURE 2-5: REGIONAL BICYCLE LEVEL OF TRAFFIC STRESS MAP (Intersections)


INCLINE VILLAGE
KINGS BEACH
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
NEVADA
CALIFORNIA
MEYERS
BICYCLE LEVEL OF TRAFFIC STRESS: INTERSECTIONS
Bicycle Level of Traffic Stress (BLTS)
BLTS 1 = low-stress
*all ages and abilities
BLTS 2 = moderately low-stress
*interested but concerned
BLTS 3 = moderately high-stress
*enthusiastic and confident
BLTS 4 = high-stress
*strong and fearless
TRPA Jurisdiction
DATA SOURCES: Cambridge Systematics; OpenStreetMap; TRPA
TAHOE REGIONAL PLANNING AGENCY
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 1.25 2.5 5 Miles

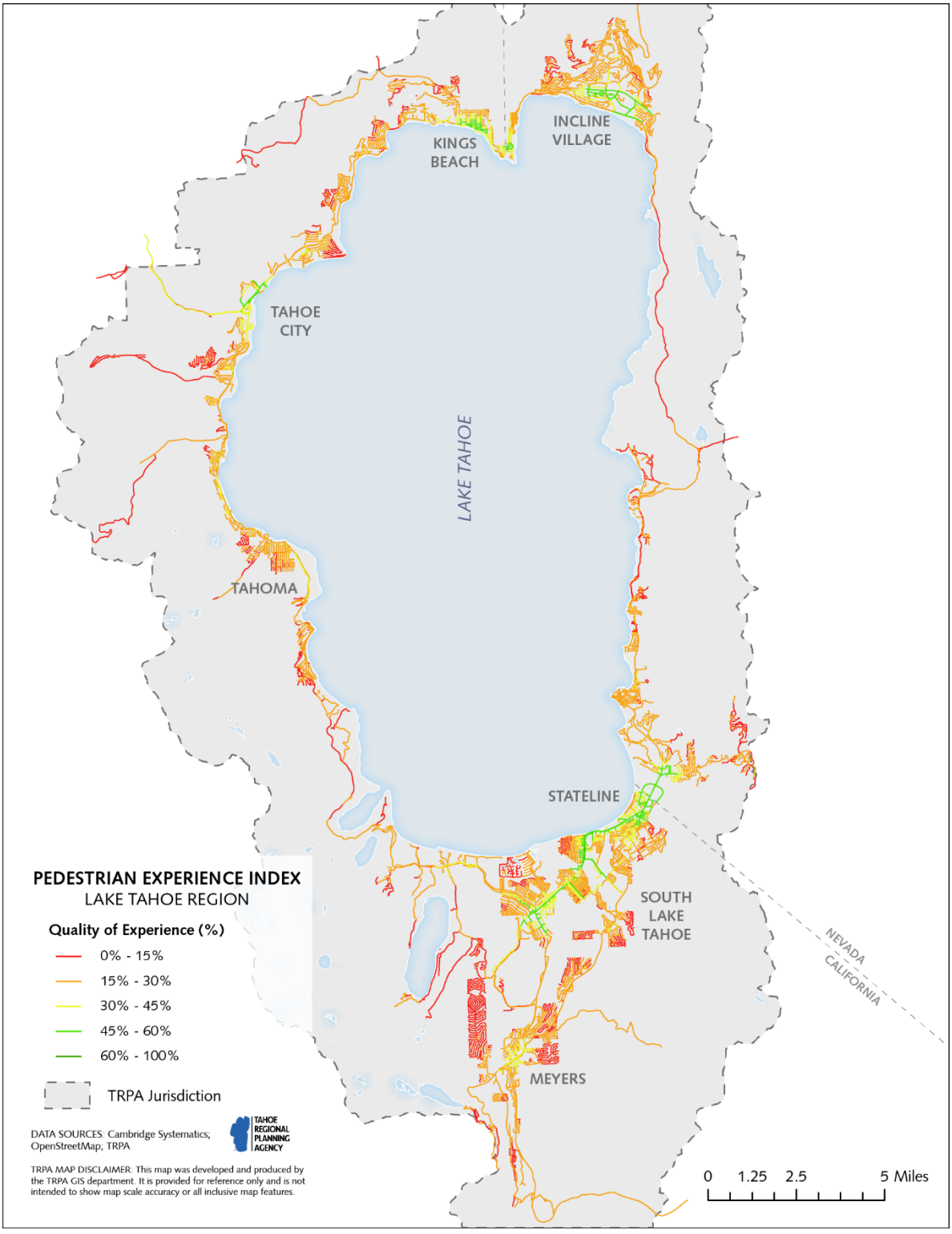
Map can be viewed at: www.trpa.gov/atp

What is the Pedestrian Experience Index?

The "Pedestrian Experience Index" (PEI) is a pedestrian complement to the Bicycle Level of Traffic Stress analysis. It incorporates similar built environment data such as presence of sidewalks, sidewalk condition, posted travel speeds, and other metrics (found in Appendix C) to qualify the pedestrian experience for each block face. The value of this analysis is for local agencies to look more holistically at the pedestrian network, separately from the bicycle network, and make appropriate project recommendations based on improving the overall pedestrian experience. As mentioned in the introduction to the plan, vibrant pedestrian spaces bring a host of positive benefits, such as economic vitality, increased public health, and safer spaces for all users. An online version of the PEI map can be found at www.trpa.gov/atp.

Photo: Novus Select 2019

FIGURE 2-6: REGIONAL PEDESTRIAN EXPERIENCE INDEX MAP


KINGS BEACH
INCLINE VILLAGE
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
MEYERS
NEVADA
CALIFORNIA
PEDESTRIAN EXPERIENCE INDEX
LAKE TAHOE REGION
Quality of Experience (%)
0% - 15%
15% - 30%
30% - 45%
45% - 60%
60% - 100%
TRPA Jurisdiction
DATA SOURCES: Cambridge Systematics; OpenStreetMap; TRPA
TAHOE REGIONAL PLANNING AGENCY
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 1.25 2.5 5 Miles

Map can be viewed at: www.trpa.gov/atp

BLTS and PEI Recommendations

As with both of the LTS and PEI analyses tools, the central focus is to create a low-stress, safe, and enjoyable bicycle and pedestrian network that has both utility purpose (taking Tahoe residents and visitors to and from their destinations), while also helping reduce Tahoe's reliance on the automobile – both in line with TRPA's environmental goals as well as creating a more vibrant quality of life for all who live in or visit the Tahoe Basin.

The overarching view of the BLTS analysis tells a compelling story for Tahoe's on street network for cyclists. While the region's patchwork of Class I trails are an extreme boon and useful facility for Tahoe's residents and visitors, careful consideration must be given to where these facilities are placed. Class I paths that cross multiple intersections and driveways create conflicts for cyclists. CA Highway Design Manual states the Class I trails are not recommended adjacent to streets or highways, or to be used as a substitute for designing the on-street bicycle facilities to be safe and low-stress. Tying this back to the four cyclist typologies, if engineers work to design low-stress on-street bicycle facilities that accommodate "no way no how" and "interested but concerned" riders, then the mode choice behavior of Tahoe's residents and visitors can begin to shift. A positive externality of this approach is that by moving away from Class I shared-use paths adjacent streets and highways and instead designing the road network to be low-stress, then the potential space becomes available to build dedicated pedestrian infrastructure, such as sidewalks. As the prevalence of electric mobility devices continues to grow, such as e-bicycles and shared mobility (scooters), this approach provides greater mode separation, creating a more pleasant and safe experience for pedestrians who no longer have to compete for space with the faster moving e-bikes/scooters.

Regarding the PEI analysis, sidewalks, particularly in town centers and commercial areas, are critical to accommodate the movement of pedestrians across our transportation network in a safe and efficient manner. A large component of this includes compliant ADA design and access for the disabled community. Noncontiguous sidewalks, lack of curb ramps, safe midblock crossings, or poor sidewalk quality are barriers for able-bodied pedestrians, and absolutely critical issues for the disabled community. Based on feedback from in-person and online public outreach, the Tahoe community seems evenly divided on sidewalks. Many locals related that they experience concern over the "urban" look associated with sidewalks. While being sensitive to these concerns, there are many residents who related they would appreciate and utilize a sidewalk should one exist, mostly for simple reasons such as walking their dog, a short trip to the grocery store, or feeling comfortable letting their child walk to school. When addressing project design, implementers should take great care at public outreach meetings on how to address residents' concerns over the aesthetics of sidewalks, while also highlighting they are an essential infrastructure tool for pedestrian safety, increasing walking as a mode share, supporting the disabled community, as well as a heightened overall pedestrian safety and experience. The plan's recommendation is to prioritize implementation of safer pedestrian infrastructure on arterial or commercial roads with access to shops and businesses, as well as collector streets that serve as main thoroughfares through residential neighborhoods. Focusing on destinations including, but not limited to, schools, transit hubs, grocery stores, and recreation destinations is also a recommended approach for

implementing dedicated pedestrian facilities (e.g. sidewalks, leading pedestrian intervals, refuges islands, etc.).

Bicycle and Pedestrian Facilities Winter Maintenance

Existing Challenges and Recommendations

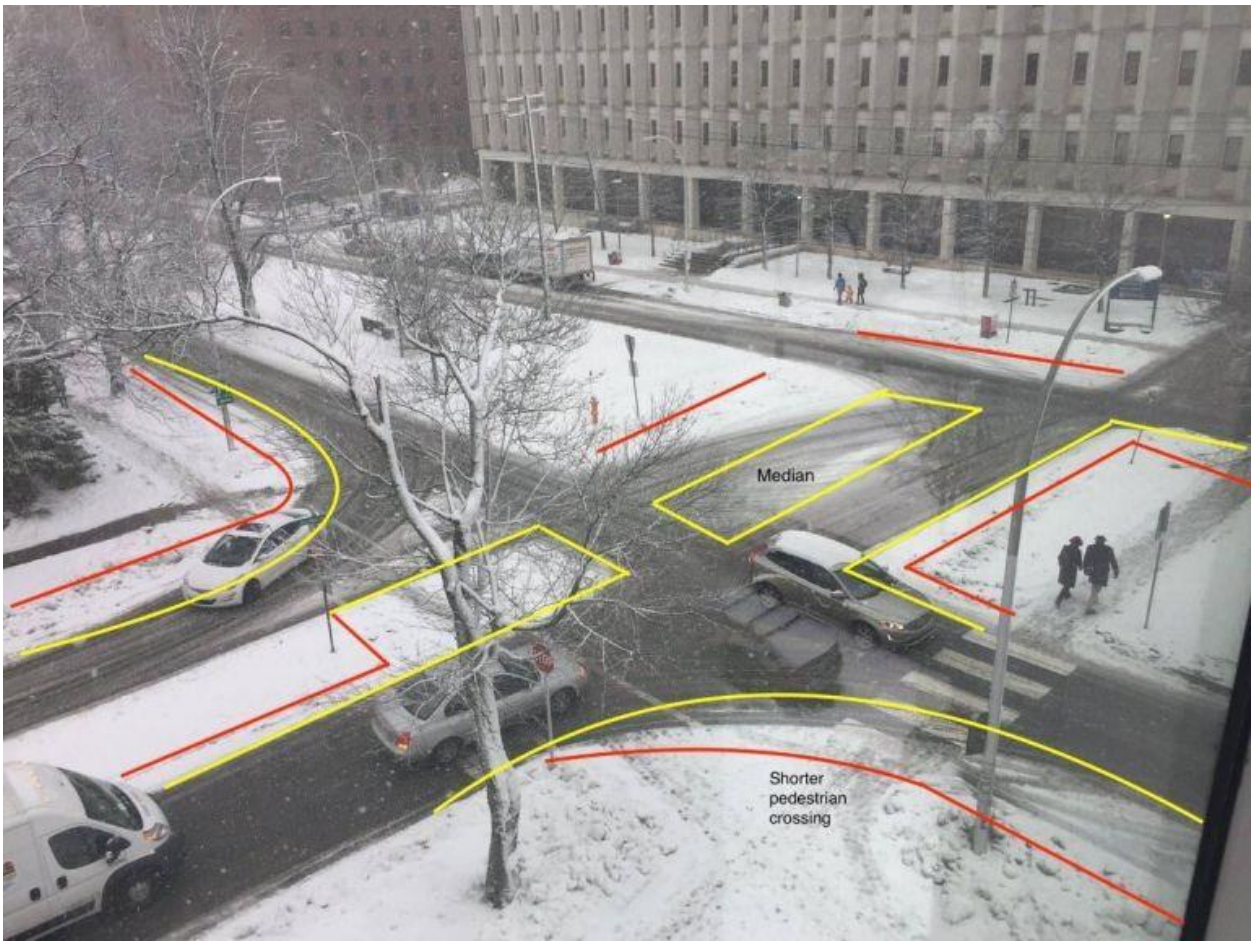
It is no secret that over the winter months Lake Tahoe can receive enormous quantities of snowfall, the annual average being approximately 275 inches. These weather events present very real maintenance challenges for our active transportation network. While TRPA recognizes these challenges, drawing upon the solutions implemented by other snowbound locations, and how they address these challenges can be a helpful tool.

The first is implementing creative road design. Understanding the need for snow storage, maintenance plans adopted alongside the design of active transportation projects, as well as utilizing the equipment and technology available to be able to design safe active transportation facilities that also allow for snow clearing is paramount. Rolled curbs and grading/snow plowing equipment designed to be used with rolled curbs are one option. Snow collection trucks following the street snowblowers and depositing the snow into snow melting devices (some are branded as “snow dragons”) is another recommendation. This option also has a water quality benefit, as you can filter and release the snow melt in a controlled manner, rather than allowing to let it collect particulate and debris over the months it takes for a snow storage pile to melt on its own.

Left: Snow Dragon snow melting device. Right: Snowplow designed specifically for sidewalks and bicycle facilities (image: streetsblog.org)

Another important tool to use is the snow itself! Geographic locations that receive a lot of snowfall use the snow to build what could otherwise be hardscape concrete features to pilot their safety measure options before spending the dollars on the more expensive hardscape infrastructure. Pedestrian bulbouts (commonly referred to as “sneckdowns”), protected intersections, pedestrians refuge islands, protected bike lanes, and most any hardscape feature can feasibly be implemented with snow before concrete. This is also a great way to pilot these preferred infrastructure projects as a way for the public to get a feel for how they work, and provide feedback, before the money is spent to design, engineer, and construct it out of concrete or other hardscape element.

Graphic depicting how to design, plan, and then implement a hardscape project first using snow.



Example of a “sneckdown” in action. Image source: headingtonliveablestreets.org.uk

Left: Small plow designed to fit within protected bike lane (source: @Lanefab/Twitter)
Right: Protected bike lane that was cleared using a machine that uses brushes instead of a plow (source: Nina Grossman/Sooke News Mirror, City of Victoria, B.C.)

Multi-Modal Connections

A complete transportation network offers multiple methods of travel to residents and visitors. A major component to successfully encouraging people to get out of their automobile and use active transportation or public transit relies on offering a convenient, timely, low-stress, and safe system. Multi-modal connections help reduce barriers to active transportation, such as long distances, physically challenging topography, or a lack of active transport facilities. Additionally, multi-modal systems must consider "first and last mile," which is how people get to and from pick-up and drop-off points to their destinations. Shared mobility has been a huge boon for the first and last mile connections in the City of South Lake Tahoe. Figure 2-7 below highlights the high number of shared scooter trips taken in South Lake Tahoe.

Some marks of a strong multi-modal system include:

- Transit stations are safely accessible by biking, walking, and rolling
- Quality and sufficient parking is available for bicycles
- Transit stations have a protected waiting area with support amenities such as benches, bathrooms, and water fountains
- Buses have sufficient bicycle carrying capacity
- Transit is timely and convenient
- Ticket prices are affordable (or free/subsidized)
- Long stretches of connected active transportation facilities
- Land use that supports a multi-modal approach

Tahoe City Transit Center. Photo: Bruce R. Damonte

Tahoe City Transit Center. Photo: Placer County

FIGURE 2-7: SHARED MOBILTY SCOOTER TRIPS MAP

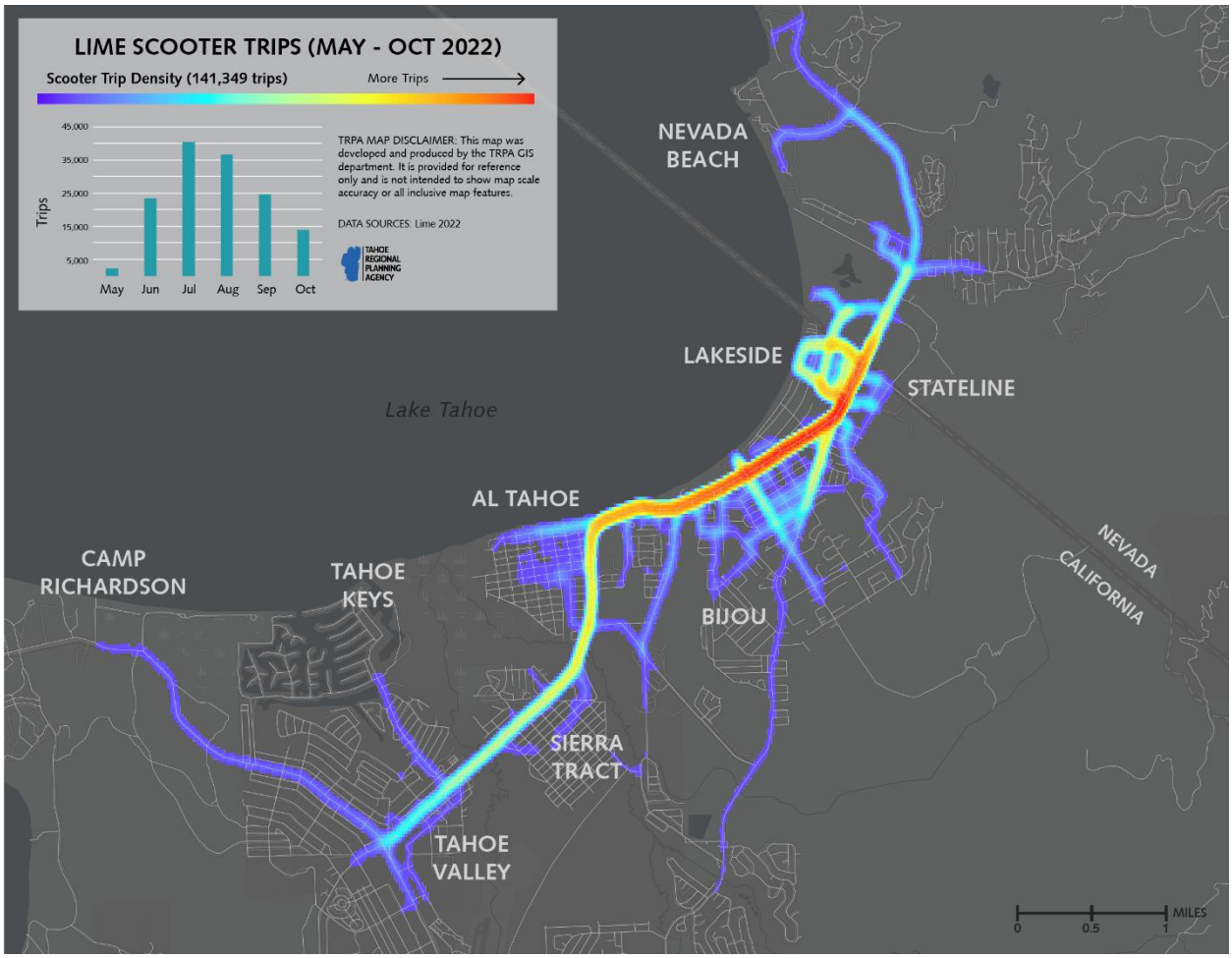
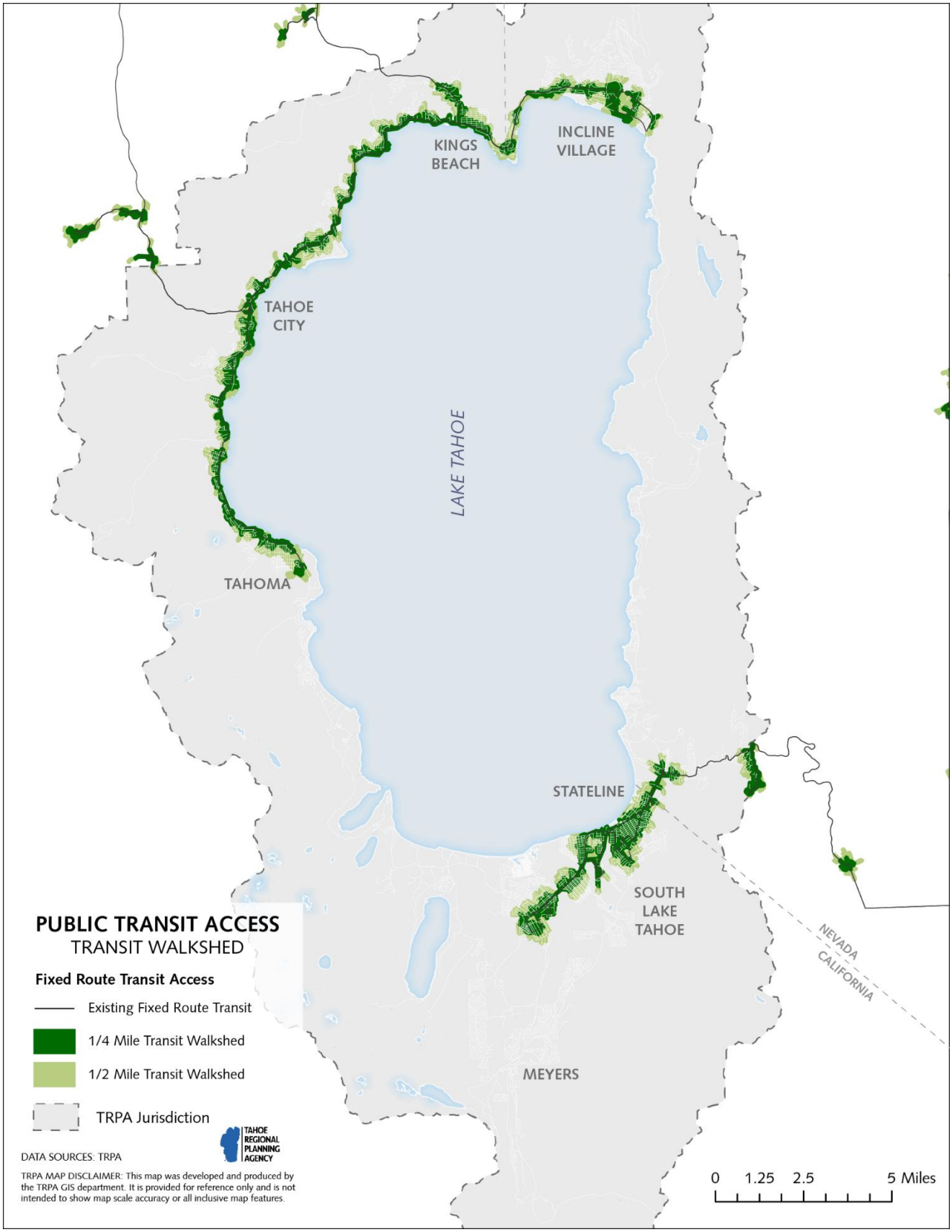
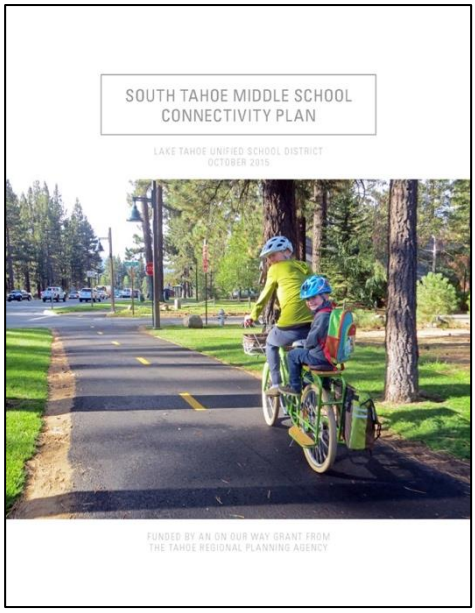


FIGURE 2-8: EXISTING PUBLIC TRANSIT WALKSHED ACCESS


KINGS BEACH
INCLINE VILLAGE
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
NEVADA
CALIFORNIA
MEYERS
PUBLIC TRANSIT ACCESS
TRANSIT WALKSHED
Fixed Route Transit Access
Existing Fixed Route Transit
1/4 Mile Transit Walkshed
1/2 Mile Transit Walkshed
TRPA Jurisdiction
TAHOE REGIONAL PLANNING AGENCY
DATA SOURCES: TRPA
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 1.25 2.5 5 Miles

Connectivity


SOUTH TAHOE MIDDLE SCHOOL
CONNECTIVITY PLAN
LAKE TAHOE UNIFIED SCHOOL DISTRICT
OCTOBER 2015
FUNDED BY AN ON OUR WAY GRANT FROM
THE TAHOE REGIONAL PLANNING AGENCY

Gaps in connectivity impact a variety of user types in different ways. The Bicycle Level of Traffic Stress analysis is an important tool to highlight network viability, and to understand where to best close gaps in connectivity. For a family of riders, parents may only feel comfortable taking their children on shared–use paths because they are completely separated from vehicular traffic. If a family cannot take the path from origin to destination, they may choose to drive even if they would prefer to bike. More experienced riders may be more comfortable riding in bike lanes with traffic but may choose not to ride because bike lanes are not well maintained, are poorly designed, or inconsistent. If sidewalks do not extend the entire distance of a common commute or do not exist at all, and pedestrians are forced to walk along the road, they, too, may decide to drive. In many cases, people do not have multiple transportation choices. During TRPA's in-person outreach, community gatherings, and tabling events, attendees related that network connectivity was a top priority.

Regional Paths (Class I Shared Use Trails)

Beyond designing our existing roadway network to be low-stress for walking, biking, or rolling, long stretches of connected shared-use paths enable users to travel long distances where roads may not always take them. The Lake Tahoe Region has a variety of Class I paths that connect users through entire towns or provide access across town. Regional path connections serve residents who live on one side of town but work on the other, or visitors who want to explore large swaths of Tahoe by bike or foot. Many regional paths already exist, are programmed for construction over the next few years, or are still in the planning phase. While these regional paths are an incredible amenity to the Tahoe Region, TRPA does not want to rely solely on their implementation for active transportation, particularly if they are planned to run adjacent to an existing street or highway.

Once all regional paths are connected around the lake, these paths will make up the **"**Tahoe Trail**"** which is a collaborative vision of the public and local, state, and federal agencies, under the Environmental Improvement Program (EIP). Once complete, the Tahoe Trail will allow users a continuous, mostly separated, shared use path around the entirety of Lake Tahoe. Separately, North Lake Tahoe local, state, and federal agencies are working to construct a 40-mile connected paved path known as the "Resort Triangle" that will join the communities of Kings Beach, Tahoe Vista, Tahoe City, Alpine Meadows, Olympic Valley, Truckee, Martis Valley, and Northstar in a continuous loop of Class I shared use path. The portion of the Resort Triangle between Tahoe City and Tahoe Vista will also be a segment of the Tahoe Trail allowing connection between the two regional pathways.

Current Use Patterns

Active transportation trips are not easily measured or projected for an entire region without extensive data collection efforts. To better understand where people are going and how they are getting there, TRPA and regional partners implemented a comprehensive bicycle and pedestrian monitoring program. In addition to consistent monitoring, TRPA also surveys on a project-by-project basis. Implementers use monitoring data to understand demand, support construction grant applications and reports, and for future planning. Figure 2-8 illustrates all monitored locations by equipment type. For more detailed analysis and up-to-date data visit the Bicycle and Pedestrian Monitoring page on Lake Tahoe Info: https://monitoring.laketahoeinfo.org/BikePed.

Lake Tahoe Info Monitoring Dashboard

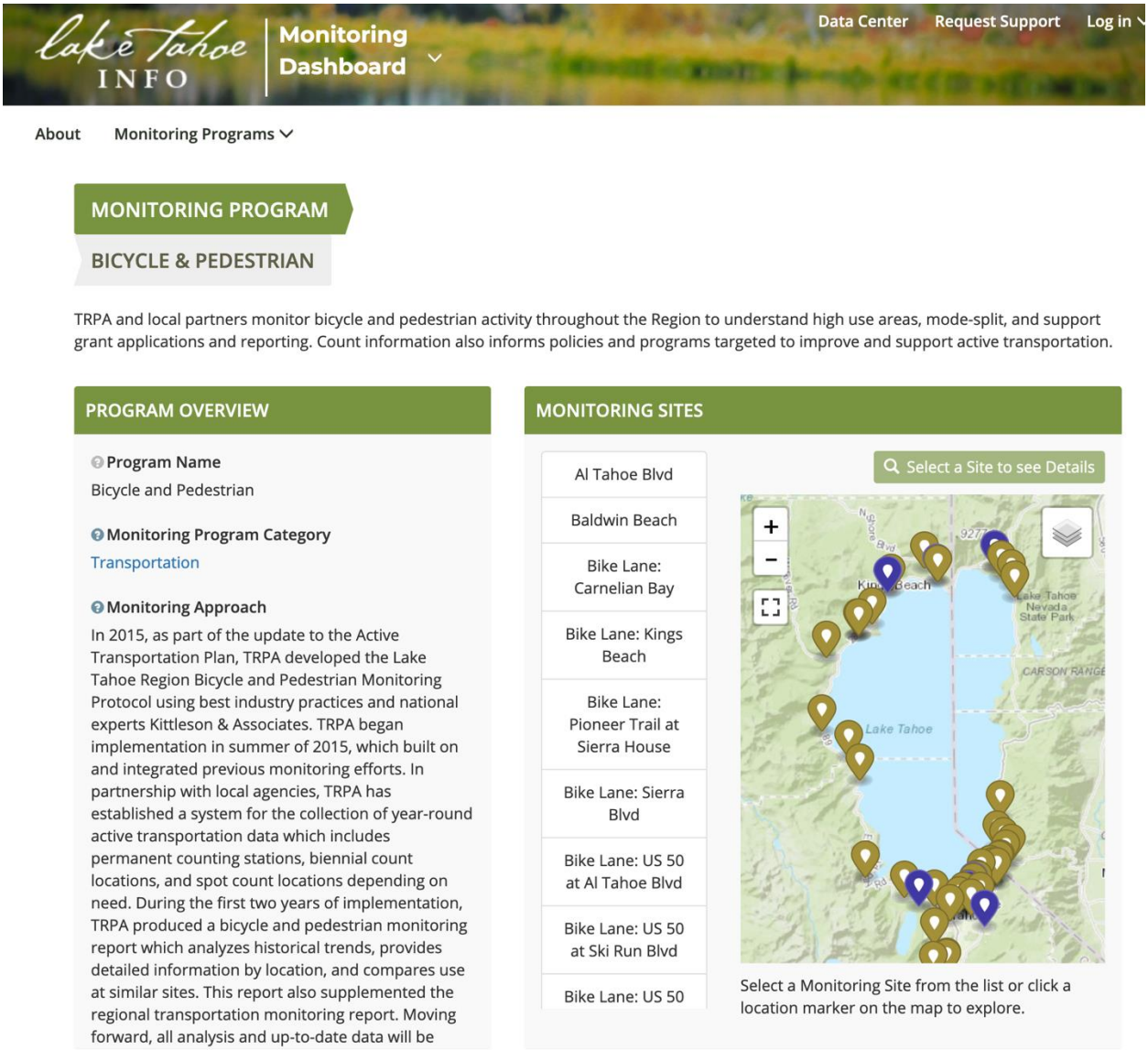
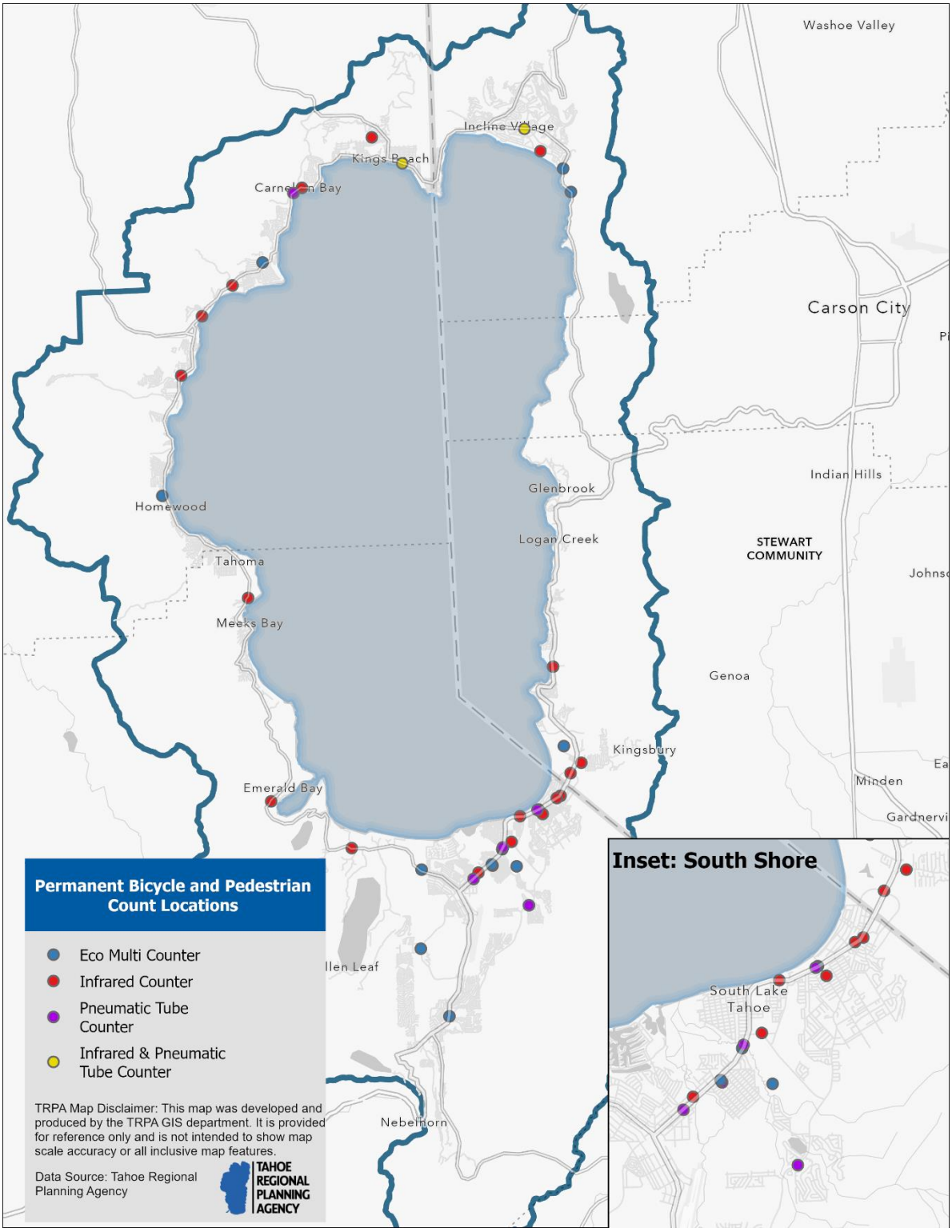

lake Tahoe INFO
Monitoring Dashboard
Data Center
Request Support
Log in
About
Monitoring Programs
MONITORING PROGRAM
BICYCLE & PEDESTRIAN
TRPA and local partners monitor bicycle and pedestrian activity throughout the Region to understand high use areas, mode-split, and support grant applications and reporting. Count information also informs policies and programs targeted to improve and support active transportation.
PROGRAM OVERVIEW
Program Name
Bicycle and Pedestrian
Monitoring Program Category
Transportation
Monitoring Approach
In 2015, as part of the update to the Active Transportation Plan, TRPA developed the Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol using best industry practices and national experts Kittleson & Associates. TRPA began implementation in summer of 2015, which built on and integrated previous monitoring efforts. In partnership with local agencies, TRPA has established a system for the collection of year-round active transportation data which includes permanent counting stations, biennial count locations, and spot count locations depending on need. During the first two years of implementation, TRPA produced a bicycle and pedestrian monitoring report which analyzes historical trends, provides detailed information by location, and compares use at similar sites. This report also supplemented the regional transportation monitoring report. Moving forward, all analysis and up-to-date data will be
MONITORING SITES
Al Tahoe Blvd
Baldwin Beach
Bike Lane: Carnelian Bay
Bike Lane: Kings Beach
Bike Lane: Pioneer Trail at Sierra House
Bike Lane: Sierra Blvd
Bike Lane: US 50 at Al Tahoe Blvd
Bike Lane: US 50 at Ski Run Blvd
Bike Lane: US 50
Select a Site to see Details
Lake Tahoe
Select a Monitoring Site from the list or click a location marker on the map to explore.

FIGURE 2-9: PERMANENT BICYCLE AND PEDESTRIAN COUNT LOCATIONS



Bicycle and Pedestrian Monitoring Protocol Overview

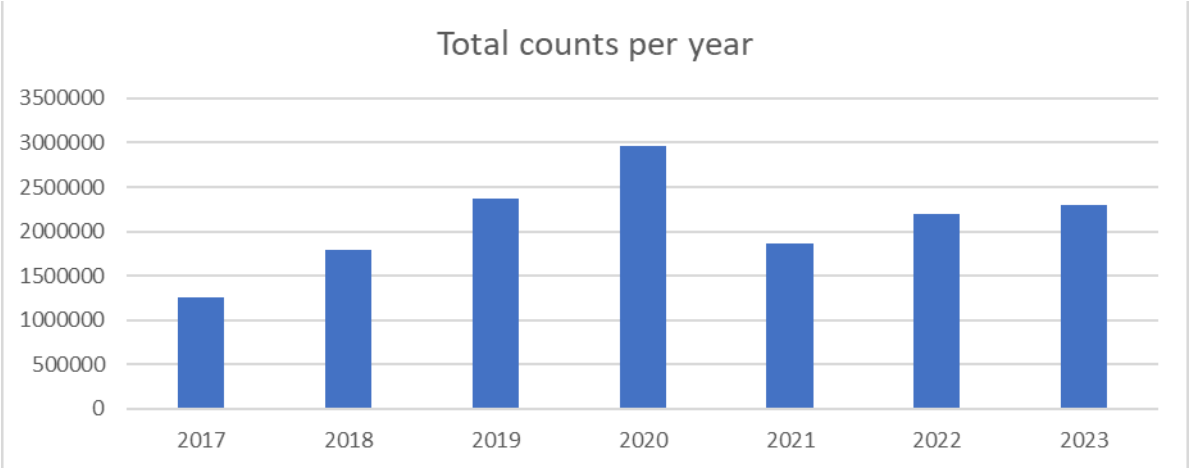
In 2015, as part of the update to the Active Transportation Plan, TRPA developed the Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol. Implementation began in 2015 with seasonal videos recorded and limited automated counting. In 2016, TRPA purchased automated bicycle and pedestrian counters that collect year-round data, differentiate between the two different users, and collect directional information. Through partnerships with local jurisdictions, counters were installed on paths throughout the Region, and are now required to be installed during construction of new shared use paths.

As of 2023, there are 48 active monitoring locations. TRPA and local partners monitor bicycle and pedestrian activity to understand high use areas and trends, measure mode-split, and support infrastructure grant management and reporting. Count information also informs policies and programs targeted to improve and support active transportation. All data can be found at https://monitoring.laketahoeinfo.org and downloaded at https://www.tahoeopendata.org/datasets/bike-and-pedestrian-counts/explore.

Results

A comparison of total users counted by the monitoring network shows that the busiest year to date is 2020 with almost 3 million users. Counts dropped drastically in 2021 and have been climbing back up since. 2.29 million users were counted across all sites in 2023.

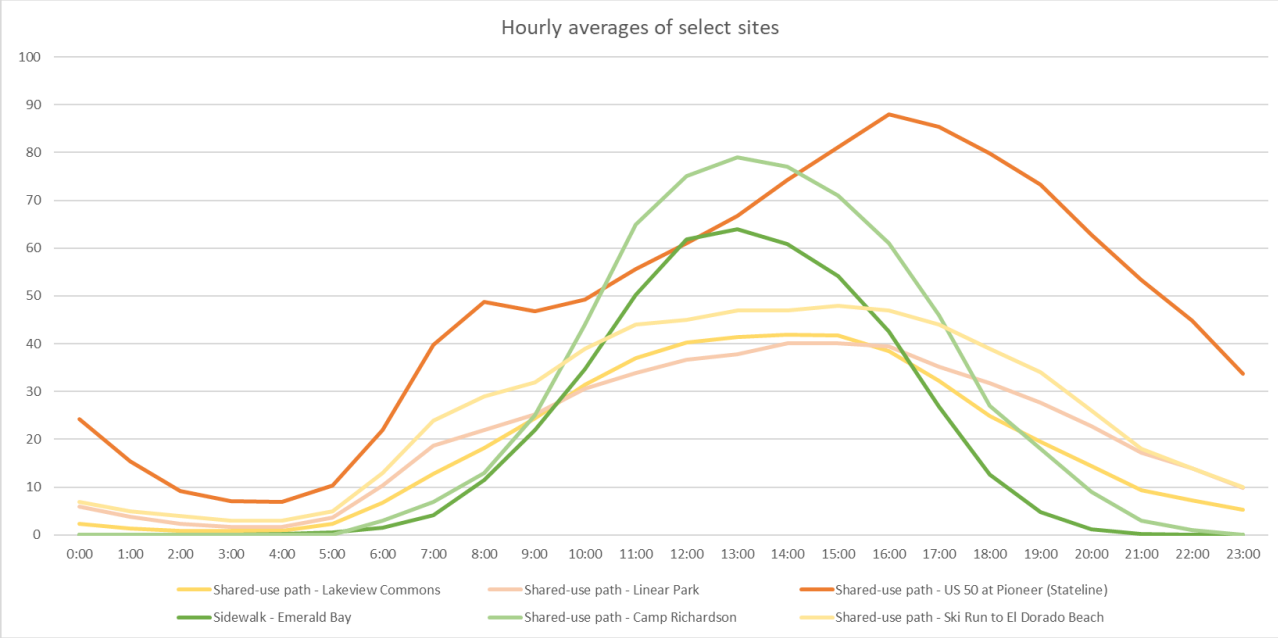
FIGURE 2-10: Total Bicycle and Pedestrian Counts Per Year



Hourly Use

Hourly usage varies across different monitoring locations. In the figure below, several sites have been selected to show popular destination locations and how they are used throughout the day vs. locations in the city of South Lake Tahoe that are used for commuting. The sites in the city have higher usage throughout the day rather than concentrated use between 10am and 4pm. US 50 and Pioneer Trail, Linear Park, Ski Run and Lakeview commons (shown in orange- yellow) have high use throughout the day whereas, Emerald Bay and Camp Richarson (shown in green) have a more prounouced peak period between 10 and 4.

FIGURE 2-11: Hourly Use of Select Sites

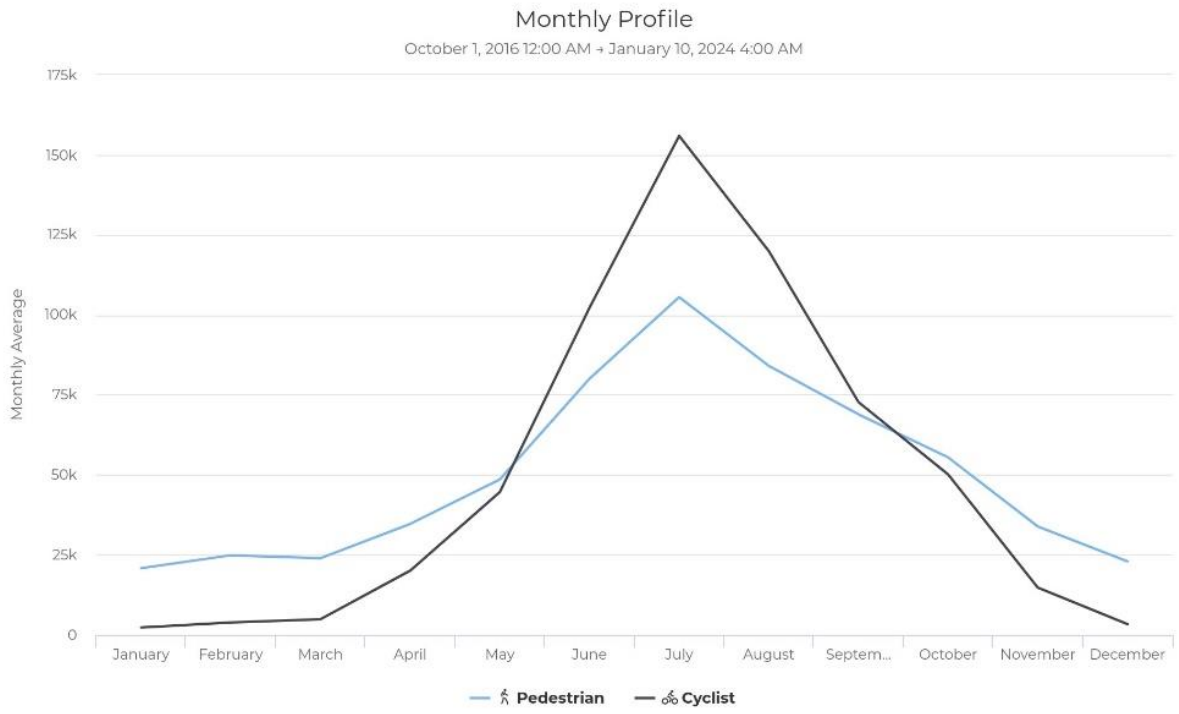


Seasonal Use

Not surprisingly, usage is strongly driven by the weather. 62 percent of usage is during summer months, then off-season use accounts for 25 percent (April, May, October, November), and lastly winter use, 13 percent. TRPA also recognizes more cyclists using trails during the warmer months from May-October and more pedestrians during the winter. Atmospheric conditions are certainly a factor, but as noted above, the trail being clear of snow or not also plays an important role in when people choose to walk, bike, or roll.

Figure 2-10: Seasonal use percentages across all sites

FIGURE 2-12: Monthly Usage Type by User



Note: Trail counters may differentiate between pedestrians and cyclists, but have less accuracy differentiating between cyclists and other "rollers", such as wheelchair users, scooter riders, or other, non-bicycle wheeled devices. For this figure, "cyclist" refers to any wheeled device recorded by the counter(s).

Project Monitoring

In addition to regular trend monitoring outlined in the monitoring plan, TRPA also conducts some pre/ post project monitoring. The Al Tahoe Safety and Mobility Enhancement Project completed a bike path in 2020. Before bike path construction, a dirt path had an average of 54 users per day. After construction there is an average of 167 users per day, over a 300% increase.

A monitor located on Al Tahoe before the Al Tahoe Safety and Mobility Project

After the Al Tahoe Safety and Mobility Project

Accessibility for the Disabled

Via the plan's outreach, stakeholder engagement, and subsequent comment period on the draft ATP, TRPA staff heard that Tahoe can be a challenging place for the disabled community. In many regards, the region is far behind other regions in accommodating and incorporating accessibility in all projects, programs, messaging, and planning processes. First and foremost, awareness of the needs of the disabled community is critical in understanding how to best build infrastructure that accommodates their needs. Staff dedicated to ensuring that Americans with Disabilities Act (ADA) or Universal Design standards are met alongside targeted outreach to underserved populations is needed to create a more holistic and accessible transportation network.

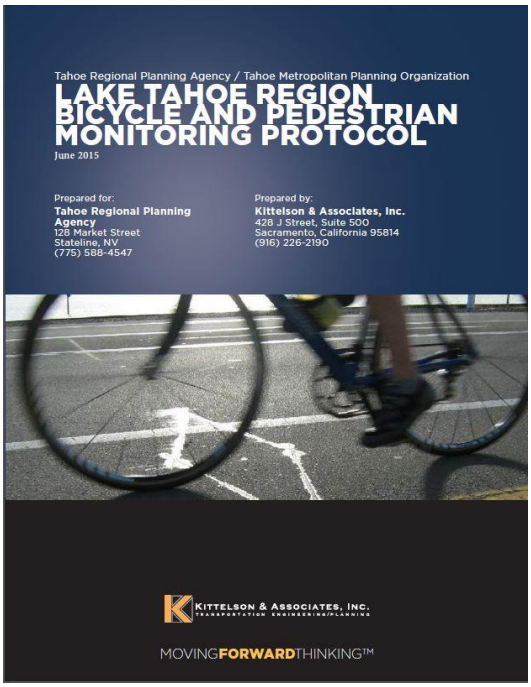
Beyond taking a proactive approach on facility design, many funding opportunities require transportation facilities to be brought up to current ADA standards during the design and construction of any new transportation facility. A common example of this are curb ramps, which have specific design specifications so that the curb ramp can be navigated by people with various levels of mobilities and impairments. A brand-new ADA compliant curb ramp is certainly laudable, however if the curb ramps are used as snow storage during the winter months their utility of being accessible completely fails. This can be a dangerous and insurmountable barrier for people using assisted mobility devices.

Accessibility considerations should not stop at transportation network design but be included in all planning and programmatic processes. Access to recreation, beaches, emergency evacuation procedures, and programs should always receive careful consideration and inclusion when implementing agencies are moving forward with any of the aforementioned initiatives. Regional equity goals highlight that the disabled communities' needs are a priority in all planning and programmatic initiatives.

Another note on accessibility is the inclusion of the disabled community in the BLTS and PEI analyses. While these analyses did not include an analysis of ADA accessibility specifically, the disabled community stands to gain similar benefits by agencies providing safe, low-stress facilities. In transportation planning terms, "pedestrian" can refer to people walking, using assisted mobility devices such as walkers, rollators, four-wheeled walkers, crutches, wheelchairs (electric or self-powered), or any assistive device that helps this community move about. Compliant sidewalks connecting to calm, signalized, and plentiful roadway crossings not only benefit abled-bodied pedestrians, but also people who rely on the range of mobility devices available. This is also true for the BLTS analysis. Low-stress roadways benefit more than just able-bodied transportation users. It is this plan's recommendation that local agencies implement location specific ADA transition plans, to further understand how they can support the disabled community in all of Tahoe's planning, programs, and construction projects.

Estimating Future Volumes

Future active transportation trips depend on multiple factors, including population, employment, climate, land-use development, and active transportation network build-out. For many years, TRPA has maintained a transportation model that estimates future vehicle trips based on land-use scenarios that is utilized in Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) updates. In the 2010 Bike and Pedestrian Plan, a bike trail user model was developed to forecast regional active transportation rates and expected use of individual facilities. The most recent 2045 model run for the 2020 RTP/SCS is used for the purposes of estimating future volumes.



Estimates of existing and future counts are calculated using the model, big data sources, literature research and actual path counts from 48 bicycle and pedestrian counters throughout the region. The future estimate assumes a high-quality, well-maintained network of Class I shared-use paths on all major corridors where use is most common in the Tahoe Region, as well as building out a Class II comprehensive network in-line with complete street strategies and advancement in technologies supporting micromobility options. The daily average is estimated to be 47,000 bicycle and pedestrian trips on the entire network, about a 17 percent mode share for active transportation. With the full build out of the network including more prevalent bike parking, and e-bike incentives and promotions, that mode share is estimated to increase to about 19 percent, which amounts to approximately 55,000 daily trips.

2.2 CHALLENGES & STRATEGIES

Although Lake Tahoe offers many regional paths, sidewalks, multi-modal connections, and on-street facilities, barriers to active transportation still exist. Challenges that discourage active transportation and the development of projects that improve active transportation infrastructure include safety, gaps in connectivity, and the high cost of operations, maintenance, and implementation. This section discusses these challenges and offers strategies to alleviate barriers.

Safety

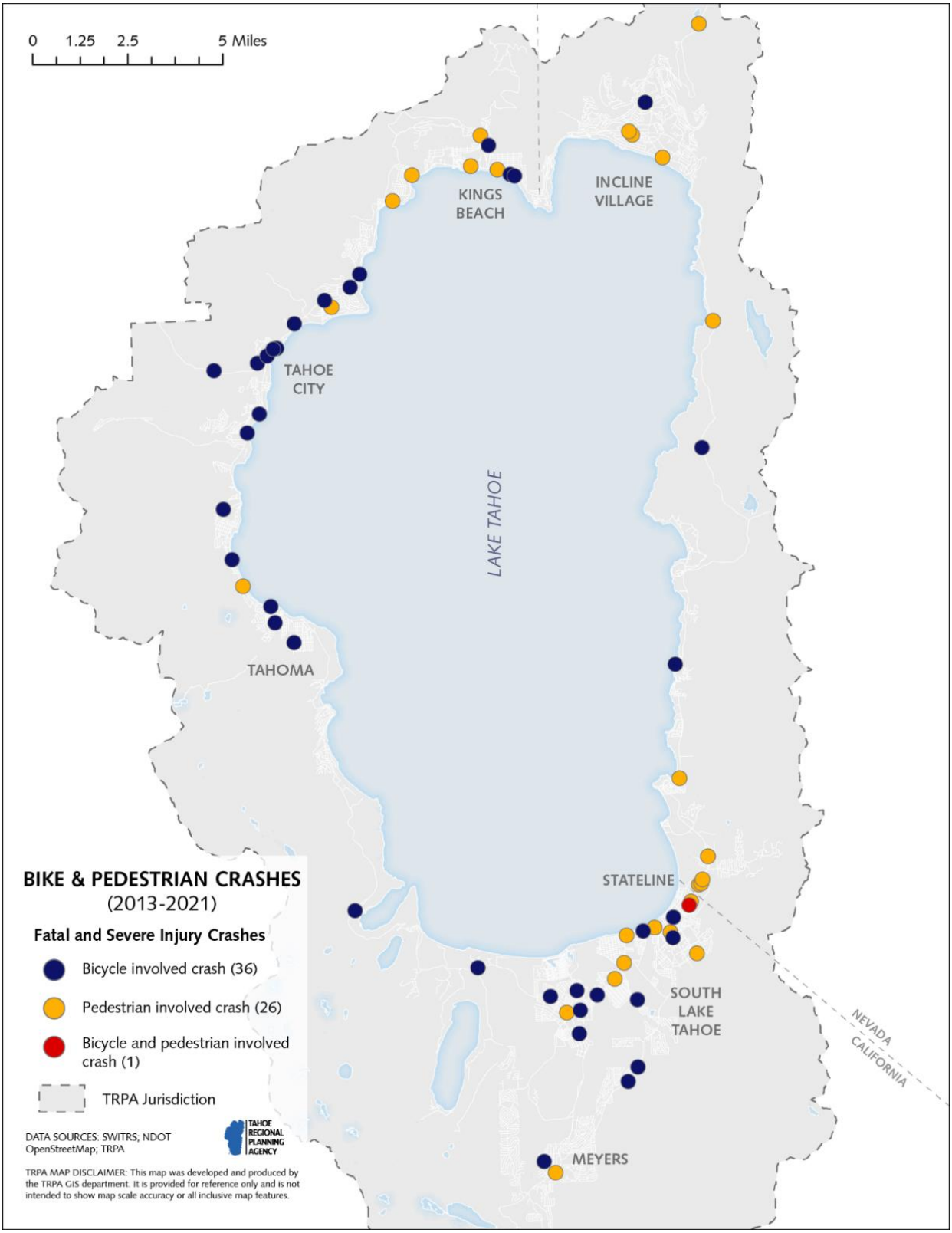
Photo: Mike Vollmer

A bicycle and pedestrian network that people feel safe using is a high priority in active transportation planning and could be a key factor in getting people out of their cars and onto the active transportation network. Road users not surrounded by a protective structure, including pedestrians, bicyclists (or e-bicyclists), skateboarders, scooter users, or highway workers in work zones, sustain a greater risk of injury in any collision with a vehicle. These road users are classified as Vulnerable Road Users (VRU) by the Federal Highway Administration. While pedestrians and bicyclists make up 14 percent of all injury crashes in the Tahoe Region, these road users are involved in 28 percent of all fatal and serious crashes and a further 31 percent of all fatal crashes. The higher percentage of vulnerable road users involved in fatal and serious crashes shows that the transportation system needs to be designed to prioritize safety of these users. Table 2-3 illustrates the latest crash data involving bicycles and pedestrians, reported by local and state law enforcement agencies to the states of California and Nevada between 2013 and 2021.

TABLE 2-3 LAKE TAHOE CRASH DATA STATISTICS

Mode	All Levels of Injuries (Count)	All Levels of Injury (Percentage of Total)	Fatal & Serious Injury Crashes (Count)	Fatal & Serious Injury Crashes (Percentage of Total)
Bicycle-Involved	145	9%	36	16%
Pedestrian-Involved	92	5%	26	12%
Bicycle & Pedestrian	3	0.2%	1	0.4%

FIGURE 2-13 LAKE TAHOE BICYCLE AND PEDESTRIAN SEVERE AND FATAL COLLISION MAP


0 1.25 2.5 5 Miles
KINGS BEACH
INCLINE VILLAGE
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
MEYERS
NEVADA
CALIFORNIA
BIKE & PEDESTRIAN CRASHES
(2013-2021)
Fatal and Severe Injury Crashes
Bicycle involved crash (36)
Pedestrian involved crash (26)
Bicycle and pedestrian involved crash (1)
TRPA Jurisdiction
DATA SOURCES: SWITRS, NDOT OpenStreetMap; TRPA
TAHOE REGIONAL PLANNING AGENCY
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.

Connectivity:

The Lake Tahoe Region has a few key locations that sever the active transportation network and act as barriers to increased use.

Gaps in Connectivity are illustrated by the following physical infrastructure issues:

- Lack of infrastructure
- Discontinuous infrastructure
- Aged facilities that no longer feel safe
- Intersections that do not accommodate all users
- Lack of wayfinding to direct users to a preferred network

Strategies to improve conditions and reduce connectivity gaps can involve small efforts such as installing wayfinding signage or big, large-scale construction projects. Implementing agencies should prioritize closing network gaps by placing these projects on their capital improvement program lists. Recently, the City of South Lake Tahoe and El Dorado County have installed wayfinding signage on their trail systems through funding provided by Measure R and Measure S. Placer County, in coordination with the North Lake Tahoe Resort Association, has created a wayfinding manual to assist in the implementation of a comprehensive wayfinding network. Washoe County, as part of a TRPA On Our Way Grant Program, created a Signage Master Plan for the State Route 28 Corridor. These are great starts to assisting users on regional trails. The on-street network could benefit from similar efforts.

- For regional connectivity gaps, implementation of large-scale projects may be necessary. These projects can be done in phases, such as first adding bike lanes and later providing a Class I shared-use path when funding is available. Interim projects can help close gaps more quickly at reduced costs. Constructing interim projects may allow more robust planning, outreach, and funding analysis to be conducted while still meeting the short-term needs of the community.

West Shore Wayfinding. Photo: Alta Planning + Design

- For more localized connectivity gaps, wayfinding signs are a small improvement that can generate a large benefit. Tourists and residents may not understand that the Lake Tahoe network is comprised of various types of infrastructure, such as bike lanes that connect to bike routes that connect to a shared-use path. Wayfinding offers people recommendations about preferred routes, provides destination and distance information, and acts as a key landmark in case of emergency.

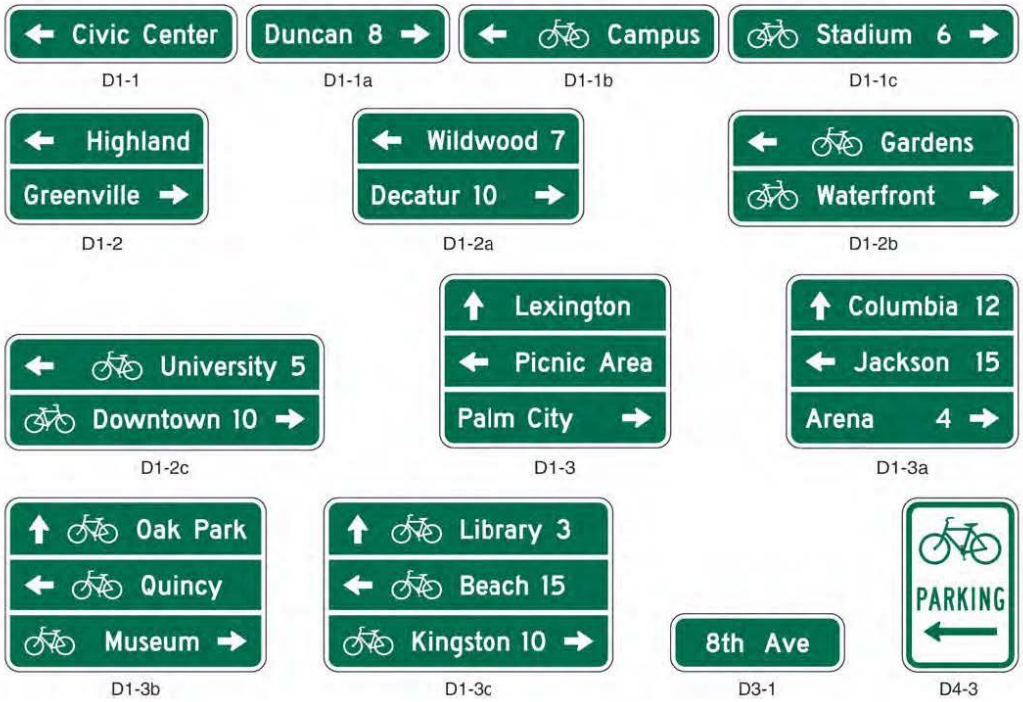
Strategies for improving wayfinding include:

- Be Consistent and use the 4 "D's"
  - Distance
  - Direction
  - Destination
  - Duration

- Integrating wayfinding into structures in the public right-of-way, such as bus shelters, permanent trash cans, and other street furniture. Information must be accessible to people with disabilities.

- Install signs to direct users in the right direction, especially at route decision points.

Figure 9B-4. Guide Signs and Plaques for Bicycle Facilities (Sheet 1 of 2)



CHAPTER 3: GOALS, POLICIES, & PERFORMANCE MEASURES

The goals, policies, actions, and performance measures in the Active Transportation Plan provide specific direction on how TRPA and partnering agencies, organizations, and private entities can work together to improve the active transportation network and increase use. The policy framework provides solutions to opportunities and challenges.

3.1 GOALS

The goals provided below expand on the more general transportation goals set forth in the Bi-State Compact, the TRPA Regional Plan, and the 2020 Regional Transportation Plan/Sustainable Communities Strategy.

- Increase connectivity by completing the active transportation network.
- Improve safety for bicyclists and pedestrians.
- Increase mode shift toward walking, bicycling, and rolling by reducing the stress of the on-street network for cyclists/shared mobility and providing dedicated pedestrian facilities.
- Increase and support consistent project implementation through technical assistance and funding.
- Develop sustainable funding sources for post project operations and maintenance.

Kingsbury Grade. High stress! Photo: Tom Lotshaw

3.2 POLICIES

Policies provide direction for partners on how to meet goals. The policies often outline critical activities in which partners are already engaged as part of their day-to-day work. Once the TRPA Board approves the Active Transportation Plan, the policies in this section will support the broader Regional Plan and will be implemented through the Code of Ordinances where distinct requirements are applied to projects, the transportation department's overall work plan as applicable, and through agreements with partnering organizations who construct and maintain the active transportation network. Policies, and associated actions are captured in matrices within each section. Many policies are fulfilled by multiple actions, and in some cases new specific actions were not identified as needed to fulfill each policy because they are already a part of daily activities.

SECTION 1: NETWORK DESIGN

1.1 Accommodate the needs of all travelers by designing and operating roads to provide for safe, comfortable, low-stress and efficient travel for roadway users of all ages and abilities, particularly vulnerable road users such as pedestrians, bicyclists, scooter riders, and other non-automotive forms of transportation.

1.2 Continue public/private collaboration in developing, funding, and implementing a complete Class I/shared-use path network around Lake Tahoe.

1.3 Through location-specific, flexible, and context-sensitive approaches, collaborate with agency stakeholders and community members to determine design solutions that meet requirements and incorporate best practices based on international, national, and state standards for active transportation.

1.4 Balance the needs of all roadway users when considering intersection improvements and impacts to level of service. Encourage implementing agencies to evaluate project design alternatives through methods other than and/or in addition to vehicular Level of Service (LOS) such as reduction in vehicle miles traveled (VMT), access for the disabled, number of increased active transportation trips, Multi-Modal Level of Service (MMLOS) and reduction in Level of Traffic Stress (LTS).

1.5 Utilize design flexibility and pursue "experimental status" when adherence to published standards is not feasible or where different standards would provide safety, economic, environmental, social, or connectivity benefits.

1.6 Construct, upgrade, and maintain active transportation facilities along major travel routes as part of all roadway improvements. In constrained locations, all design options should be considered such as restriping, signalization, and narrowing travel lanes.

1.7 Support and encourage local jurisdictions and school districts in removing barriers to active transportation planning, facility design, and implementing projects and programs.

1.8 Incorporate applicable Best Management Practices (BMPs) into facility and maintenance design to support environmental and financial sustainability.

Section 1: Network Design Policy Action Matrix

Policy Number	State	Regional	Local	Private	Community
1.1	**X**	**X**	**X**	**X**	**X**
1.2	**X**	**X**	**X**	**X**	**X**
1.3	**X**		**X**	**X**	
1.4	**X**	**X**	**X**	**X**	
1.5	**X**	**X**	**X**		
1.6	**X**		**X**		
1.7	**X**		**X**		**X**
1.8	**X**	**X**	**X**	**X**	

SECTION 2: FACILITY MAINTENANCE

2.1 Collaborate with agencies responsible for maintenance of active transportation facilities to ensure year-round use and condition of active transportation facilities, including prioritizing that connections are not blocked during snow removal or are quickly made available through clearing. This also includes maintaining and upgrading infiltration devices, clearing snow, sweeping, and re-striping where needed during the season and before major cycling events. State agencies should provide timely highway maintenance in the spring of each year and coordinate with local agencies on snow storage and operations maintenance. Active transportation facilities should not serve as temporary snow storage areas.

2.2 Prior to permit issuance, all projects containing active transportation facilities are required to submit a Maintenance Responsibilities Chart and Plan. These plans will clarify roles for annual and capital infrastructure operating and maintenance and identify funding needs and possible sources. This information will be included in the approved permits. See Appendix E, for *Maintenance Responsibilities Chart and Plan Template.*

2.3 Support long-term operations and maintenance activities for existing and future facilities by encouraging local jurisdictions to request use of available TRPA Mobility Mitigation Funds.

Section 2: Facility Maintenance Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community
2.1	X		X		
2.2	X	X	X	X	
2.3		X	X		

SECTION 3: MULTI-MODAL CONNECTIONS

3.1. Create convenient intermodal connectivity which considers first and last mile facility needs and connects all modal options by providing necessary infrastructure, and schedule coordination.

3.2. Encourage local jurisdictions to work with public and private entities to analyze space devoted to bicycle parking on existing and planned projects to ensure that space is allocated appropriately.

3.3. Maximize bicycle carrying capacity on all transit vehicles, prioritizing high-use multi-modal routes, reflecting current state policy, and using best available technology.

3.4. Encourage jurisdictions and other maintenance agencies to identify opportunities for efficient and innovative parking strategies that reallocate roadway space to provide for the active transportation network. This policy also applies to the repurposing of automobile parking for compliant bicycle parking.

Section 3: Multi-Modal Connections Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community
3.1		X	X	X	X
3.2		X	X	X	
3.3		X	X		
3.4	X	X	X		

SECTION 4: PROJECT IMPLEMENTATION

4.1 Support agencies Region-wide in adopting complete street policies and resolutions.

4.2 Actively pursue funding for priority projects, programs, and maintenance in collaboration with partnering agencies, private entities, and community groups.

4.3 If construction impacts an active transportation route, projects must adhere to the appropriate MUTCD which requires the implementing agency to provide appropriate temporary signage, alternate routes, and safe accommodations for all modes.

4.4 Incorporate segments of the proposed active transportation network into new and redeveloped commercial, tourist, multi-family, public service, and recreation projects consistent with this plan. Implementation of the facilities will be conducted through construction, easements, or in-lieu fees as appropriate to the scale of development per the TRPA Code of Ordinances, section 65.3.2.

4.5 During project planning and permit approval, identify and address the need for support and end-of-trip active transportation facilities including bicycle parking, water fountains, benches, and restrooms at commercial, tourist, recreational, transit, lodging, and government centers.

4.6 Projects should go forward regardless of where they are on the priority list when an opportunity or eminent loss of an opportunity makes implementation favorable or necessary.

Section 4: Project Implementation Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community
4.1		**X**	**X**		
4.2		**X**	**X**		**X**
4.3	**X**		**X**		
4.4		**X**	**X**	**X**	
4.5		**X**	**X**	**X**	
4.6		**X**	**X**		**X**

SECTION 5: EDUCATION, ENCOURAGEMENT, EVALUATION, AND ENFORCEMENT PROGRAMMING

5.1 In collaboration with law enforcement, school districts, and community groups, educate roadway users about their legal rights and responsibilities through education and encouragement programming.

5.2 Through public/private partnerships, continue to prioritize and implement consistent Region-wide wayfinding and path etiquette strategies.

5.3 Evaluate active transportation trends and project effectiveness through implementation of the Lake Tahoe Bike & Pedestrian Monitoring Protocol in partnership with local and state jurisdictions.

5.4 Evaluate implementation of active transportation goals and policies and report on benchmarks through the development of the Biennial Transportation Performance Report.

5.5 Update the Active Transportation Plan facility improvements and programmatic opportunities as needed every four to five years in conjunction with each Regional Transportation Plan update.

5.6 As new mobility technologies emerge, partnering agencies should analyze data and determine if regulation or new design considerations are necessary to accommodate all users and continue to support increased mode share.

5.7 Encourage all state and local law enforcement agencies to develop and implement an enforcement program that reduces behaviors that act as barriers to safe active transportation, including parking restrictions, distracted driving, impaired driving, 3-foot laws, and other known crash-inducing behaviors.

5.8 All active transportation projects and improvements should consider including permanent monitoring and detection infrastructure such as inductive loops, passive infrared, and signal detection systems.

Section 5: Education, Encouragement, Evaluation, and Enforcement Programming Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community
5.1		X	X		X
5.2		X	X	X	X
5.3		X	X		X
5.4		X			
5.5		X			
5.6	X	X	X		X
5.7	X		X		
5.8	X		X		

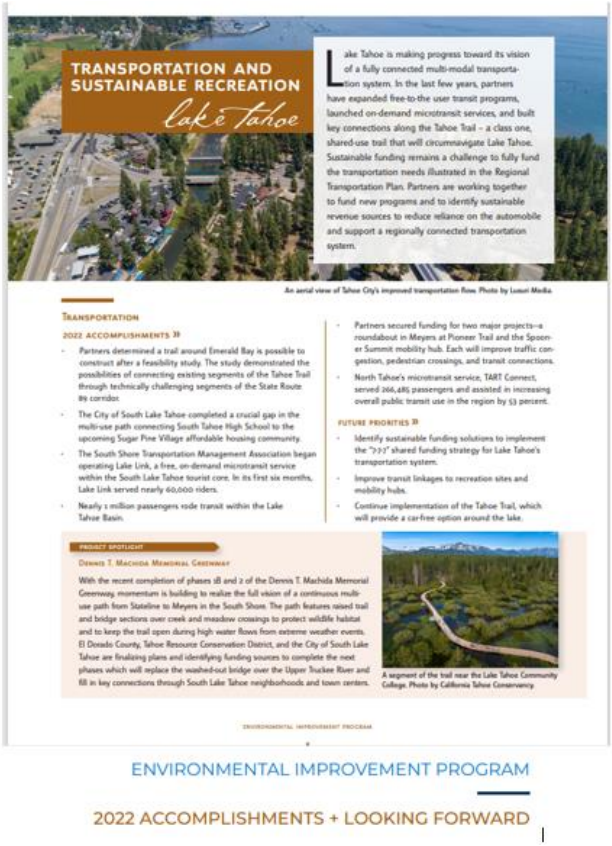
3.3 PERFORMANCE MEASURES

Setting performance measures for plans, projects, and programs is crucial when determining where funding, infrastructure improvements and other resources should be directed. The TRPA Research and Analysis Department, in coordination with other TRPA departments and agencies throughout the region, manage robust monitoring efforts that track progress. Active transportation performance measures are aligned with appropriate TRPA Environmental Improvement Program (EIP) and Regional Plan targets and thresholds as well as broader targets set by the federal and state governments. A variety of online tools exist to help illustrate progress, including the EIP Project Tracker and the Sustainability Dashboard (http://www.ltinfo.org/).

Performance Measure Evaluation and Monitoring

By monitoring effectiveness, agencies can be adaptive and flexible, ensuring progress. The most recent transportation performance biennial report identified three measures for tracking active transportation goals and strategies and outlines a process for adaptive management as needed.

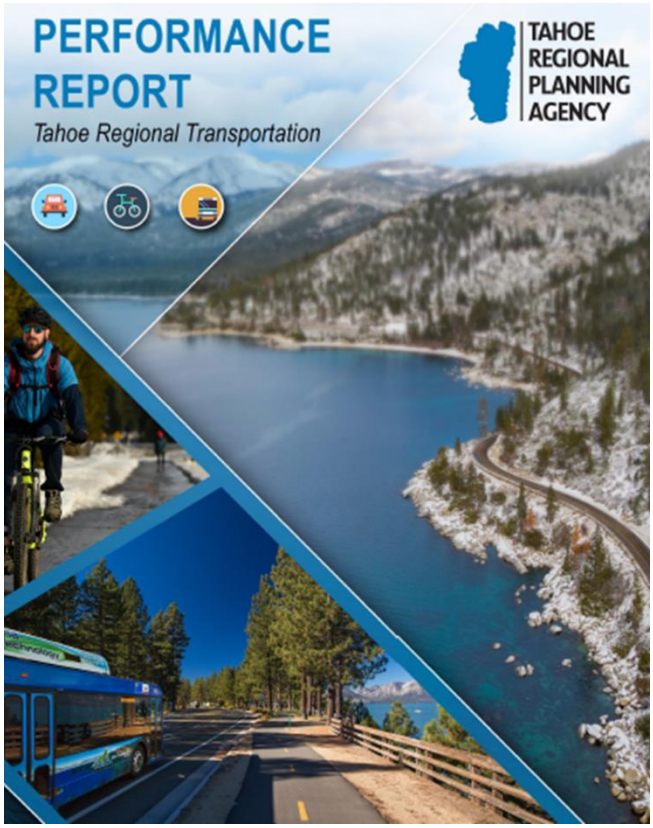
To align transportation performance measures across the many planning efforts conducted region-wide, this plan is incorporating the 2020 RTP/SCS biennial performance report that provides a holistic review of performance for not just active transportation but includes transit and auto metrics that must work together for active transportation to advance in the region. These newer metrics will also be folded into the 2025 Regional Transportation Plan update. These measures and a brief analysis are listed below. Baselines and methods are provided and should be used for comparison during the next Active Transportation Plan update.



The measures listed below are not the only way the plan's effectiveness will be monitored. The goals and policies put forth in this plan are tracked through several other reports, such as the TRPA Environmental Improvement Program accomplishments, and every other year through the Transportation Performance Report, first becoming available for review June 30th, 2024.

Performance Measure 1 (RP #5): *Increase percentage of all trips using non-automobile modes of travel (transit, bicycle, pedestrian).*

Analysis: The biennial performance report will include information on bicycle and pedestrian activity for the Regional Plan performance measures. Transit data will also be included in the full biennial Transportation Performance Report with all mode shares. Collecting active transportation data at Lake Tahoe was previously completed using intercept surveys at commercial and recreation sites in the winter and summer months. Most recently, TRPA modified its data collection methodology to utilize new, and more reliable data sources. Estimates of existing and future counts are calculated using a transportation model, big data sources, literature research and actual path counts from 48 shared use path counters throughout the region. The future estimate assumes a high-quality, well-maintained network of Class I shared-use paths on all major corridors as proposed in this plan where use is most common in the Tahoe Region, as well as building out a Class II(b), Class III, and Class IV comprehensive bikeway network in-line with complete street strategies and advancement in technology supporting micromobility options.



The daily average is estimated to be 47,000 active transportation trips on the entire network, which is about 17 percent of the total mode share. Through the implementation of the recommendations and projects within this plan, including more prevalent bike parking and e-bike incentives and promotions, the active transportation mode share is estimated to increase to 19 percent, which would be about 55,000 daily trips for the region.

Performance Measure 2 (RP #6): *Decrease annual average daily vehicle miles traveled (VMT) per capita (excluding through-trips).*

Analysis: The Regional Transportation Plan's main strategy to reduce greenhouse gas emissions is to reduce VMT by increasing access to active transportation facilities and multi-modal connections. Thus, a reduction in VMT should directly reflect an increase in active transportation access and use. TRPA set a decrease target of 1 percent daily VMT by 2024, from 2018. A full evaluation of this performance measure will be made later in 2024 and included in the 2024 Biennial Transportation Performance Report.

Performance Measure 3 (new): *Reduce Bicycle Levels of Traffic Stress at intersections and along roadway segments.*

Analysis: A transportation performance technical advisory committee was created during the approval process of the 2020 RTP/SCS. The technical committee proposed to monitor the region's bicycle level of traffic stress (BLTS) which includes identifying locations, intersections and segments that need to be prioritized for improvements. Reducing levels of traffic stress through programmatic improvements, like removing gaps in the network and designing bicycle improvements with physical separation within on-street bicycle facilities, will help increase the number of trips on the bicycle network. The BLTS at intersections is measured in levels 1 through 4, and 1 through 4.5 for segments, one being least stressful, and 4-4.5 being this most stressful. The goal is to continually reduce the number of stressful intersections (currently 156) and segments (currently 104) with a BLTS score of 4 or higher over time. This measure will be consistently tracked in the biennial Transportation Performance Report and updated in the next RTP/SCS update and any accompanying active transportation plans.

Performance Measure 4 (new): *Increase the total number of "best" quality lane miles for pedestrians.*

Analysis: A transportation performance technical advisory committee was created during the approval process of the 2020 RTP/SCS. The technical committee proposed to monitor the pedestrian experience and report the number of "quality" lane miles provided. This can be measured using the "Pedestrian Experience Index" (PEI) which incorporates built environment data such as presence of sidewalks, sidewalk condition, posted travel speeds, and other metrics to quantify the quality of the pedestrian experience for each block face. The value of this analysis is for local agencies to focus more holistically on the pedestrian network, separately from the bicycle network, and make appropriate project recommendations based on improving the overall pedestrian experience. Removing stress through either programmatic improvements, like safe routes to school education awareness and events, or by physical improvements, like additional crossings and lighting, will help to increase the number of trips made by foot. The Pedestrian Experience Index provides an index rating quantifying a poor-to-best quality of pedestrian user experience of the roadway network. Zero percent to 45 percent being quantified as a low-quality experience (no sidewalk present) and 45 percent to 100 percent being a higher quality of experience. The goal is to increase the pedestrian experience index to 45 percent or higher outside of town centers and increase the pedestrian experience within town centers to reside between a 60 percent to 100 percent index rating. This measure will be consistently tracked in the biennial Transportation Performance Report and be updated in the next RTP Update.

Performance Measure 5 (Federal Performance Measures): *Decrease serious injuries for bicycles and pedestrians and reduce fatalities to zero by 2050.*

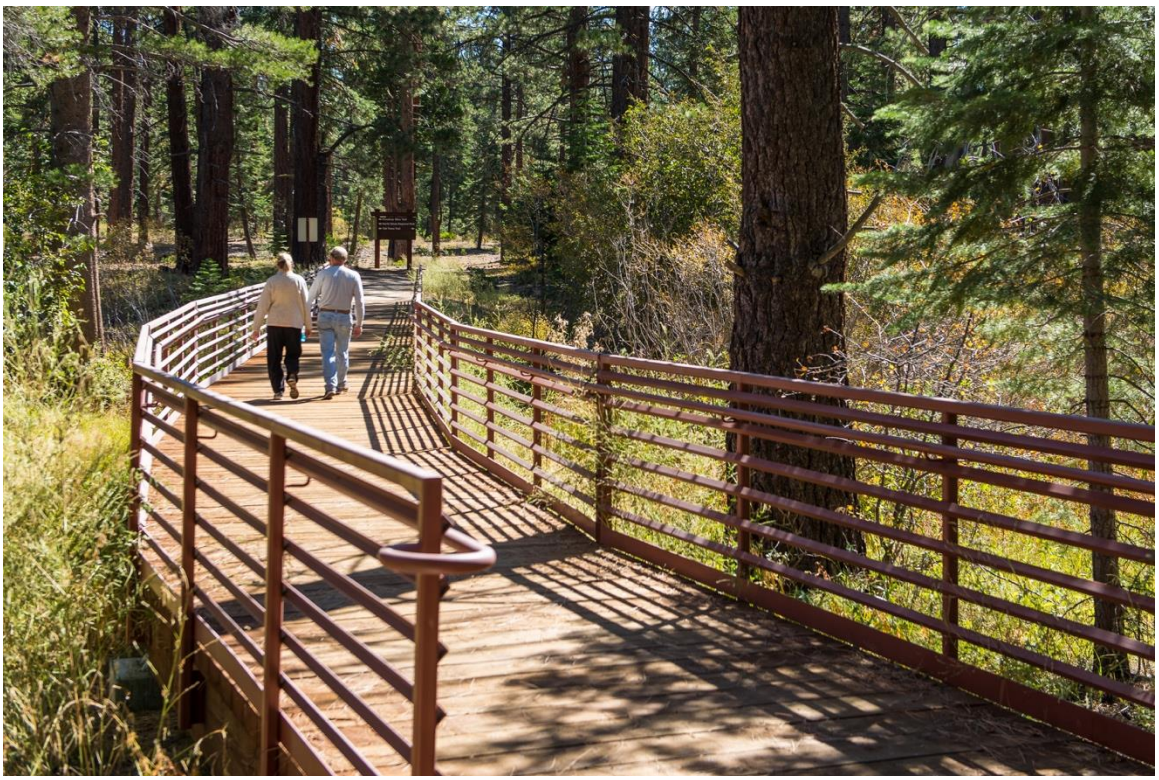
Analysis: the 2017 and 2020 Regional Transportation Plan/Sustainable Communities Strategy incorporated new performance measures consistent with the Moving Ahead for Progress in the 21st Century Act (MAP-21, P.L. 112-141). Performance measures related to safety include the number of serious injuries and fatalities for non-motorized (bicycles and pedestrians) with the goal of reducing fatalities to zero by 2050. The Vizion Zero Strategy (strategy), endorsed by the TRPA Governing Board in

February of 2024, provides a full analysis of fatalities and serious injuries. The strategy includes a preemptive solution that identifies high-injury networks to help prioritize the implementation of projects. Analyzing a 5-year rolling average per the federal rule, between 2016 and 2020 there were 102 total reported serious injuries reported, 27 of which included bicyclists and pedestrians in the Tahoe Region. Twenty fatalities occurred, with eight of those being bicycle and pedestrian deaths during this time period. Pedestrian and bicycle collisions amount to 25% of the serious injuries and about 30% of the fatalities that occur in the Tahoe Basin. Bicycle and pedestrian collision reporting is not always accurate. This measure is reported annually to each state and reported in each RTP/SCS.

Lotshaw 2015.

3.4 NOTABLE ACCOMPLISHMENTS

Since 2010, many active transportation projects throughout the region have broken ground and are providing excellent commute and recreational opportunities. Funding, implementation, and ongoing maintenance of these projects are the joint effort of many agency partnerships.



Snow Creek Restoration Project. Photo: Tom Lotshaw

Shared-Use Paths: In total, **9.3 miles** of path have been constructed since 2018.

- Dollar Creek Shared Use Trail: *Placer County*
- Jameson Beach Road Path: *U.S. Forest Service*
- Lake Tahoe Blvd Class I: *City of South Lake Tahoe*
- Tahoe East Shore Trail: *Nevada Department of Transportation*
- West Shore Tahoe Trail to Meeks Bay: *Tahoe Transportation District*
- E to W San Bernadino Bike Path: *El Dorado County*
- Baldwin Beach Bike Path: *U.S. Forest Service*
- Al Tahoe Blvd Connector: *City of South Lake Tahoe*
- Sierra Blvd Complete Streets: *City of South Lake Tahoe*
- Dennis Machida Memorial Greenway Phase 1b & 2: *El Dorado County*

Bike Lanes: In total, almost 2 miles of bike lanes have been added since 2018.

- US Hwy 50, South Tahoe “Y” to Trout Creek: *California Department of Transportation*

Sidewalks: In total, 4.8 miles of sidewalk have been constructed since 2018.

- Sierra Blvd Complete Streets: *City of South Lake Tahoe*
- US Hwy 50 "Y" to Trout Creek Sidewalks: *California Department of Transportation*
- US Hwy 50 at Herbert Avenue to Ski Run Blvd: *City of South Lake Tahoe*

Enhanced Crosswalks: Since the last plan update, the region saw three new pedestrian-activated beacons installed in the City of South Lake Tahoe, and in Incline Village by Nevada Department of Transportation. The City of South Lake Tahoe also installed a flashing stop sign to increase driver yielding rates at the crosswalk. The California Department of Transportation and Nevada Department of Transportation each converted one unsignalized intersection into a signalized intersection, with crosswalks.

- Al Tahoe: Mid-block flashing beacon and enhanced crossing paint connecting the new Dennis T. Machida trail segment (City of South Lake Tahoe)
- Lake Tahoe Blvd & Julie Ln: flashing beacon crosswalk installed (City of South Lake Tahoe)
- Tahoe Keys Blvd & Washington Ave: flashing stop sign installed (City of South Lake Tahoe)
- Ski Run Blvd and Tamarack Ave: flashing stop signs installed (City of South Lake Tahoe)
- Lodi Ave & U.S. 50: Intersection converted from a two-way stop to a traffic signal with all-way crossings installed (Caltrans)
- Warrior Way & U.S. 50: Traffic signal installed with crosswalk (NDOT)
- SR 28/Incline Village Shopping Center West: crosswalk upgraded to a flashing beacon and reflective signs (NDOT)

Roundabouts: Implemented by Nevada Department of Transportation, Caltrans, Placer County, and Washoe County

Properly designed roundabouts reduce traffic congestion, lower vehicle speeds, reduce pedestrian exposure, and add aesthetic value to communities. Roundabouts are most appropriate where pedestrian volumes are low, but care should be taken to understand if pedestrian volumes could be higher if infrastructure was there to support them. If pedestrian volumes are high, or could be increased through pedestrian supportive infrastructure, signal controls and wider crosswalk widths, should be used. Roundabouts should include raised crossings and pedestrian hybrid beacons to better provide access for visually impaired pedestrians. Special considerations need to be taken for multilane roundabouts, as safety benefits for pedestrians and bicycles are reduced compared to single lane roundabouts and may discourage active transportation utilization.

A new roundabout was constructed at the intersection of U.S. 50 and SR 89 in Meyers, El Dorado County. Two roundabouts were constructed in Tahoe City in 2019. The easterly roundabout at W Lake Blvd & Lake Blvd includes a crosswalk with a pedestrian island, connecting to the Class 1 multi-use path. The westerly roundabout at W River Rd and Lake Blvd includes a new bridge over the Truckee River with an underpass for active transportation users. This is most ideal as trail users do not need to interact with the unsignalized intersection at all while still traveling adjacent the roadway network. A third roundabout is planned for the Tahoe City "wye" intersection, along with the rebuild of Fanny Bridge and a complete street project.

Kings Beach Roundabouts. Photo: Placer County

CHAPTER 4: NETWORK RECOMMENDATIONS

This chapter provides in-depth details and recommendations for each corridor in the Lake Tahoe Region. Through review of existing plans, community outreach, agency stakeholder professional expertise, and previously programmed projects, each corridor illustrates proposed active transportation routes and infrastructure. This chapter is made up of seven sections that contain:

- Physical Geographic Description
- Context Relevant Plans & Studies
- Additional Corridor Considerations
- Existing & Proposed Active Transportation Network Maps
- Crash Analysis Map
- Corridor Project List and Cost Estimates

4.1 PROPOSED NETWORK

The proposed network is comprised of planning and design level projects. Projects are included in the planning level project list if they live in planning documents (such as area plans) but have not yet begun in depth project development. Design level projects are further along in project development and could be undergoing design, environmental review, or are ready for construction. More information and recommendations regarding planning and design level projects is provided below.

****Alignments found in this plan are conceptual***. As the region progresses towards the implementation of complete streets, pre-determining location-specific infrastructure or routes may not be the best solution to meet the needs of all users. Infrastructure type and route recommendations found in this plan should be used as a catalyst for project development and for programming into TRPA's EIP and local jurisdiction's capital improvement programs (CIPs).

Some areas on the *Existing & Proposed Active Transportation Network* maps are displayed as "complete street" segments of roadway. These locations are chosen based on many factors such as: residential and commercial density, preponderance of high-injury collisions, lack of existing active transportation infrastructure, and existing plans for redevelopment. These designations do not exclude any other project from being considered for complete street improvements. The "complete streets" category specifically was designed as a catch-all designation, implying that further study alongside preliminary engineering and design must first be completed before understanding the appropriate facility type. The cost estimates of complete streets designated projects are a bit inflated, to accommodate the myriad of infrastructure that is associated with larger and more complex projects. That said, these cost estimates could be much lower if a lesser facility type is determined to be more appropriate. All projects within the region should consider improving the streetscape to increase safety, economic vitality, and mobility for all users.

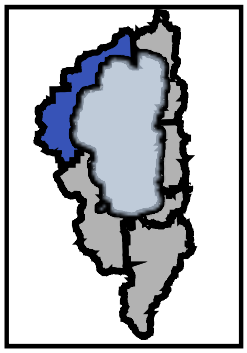
To follow best practice road design, to provide increased capacity for the various new forms of mobility devices such as electric mobility (e.g. bicycles, scooters), as well as to increase utility trips for cyclists who wish to use the roadway network, support for low stress, on-street bicycle facilities, coupled with accessible sidewalks should be the standard design choice in commercial corridors, residential areas, and town centers. Class 1 trails (shared use paths) should only be considered in locations where the road network already does not take you (such as through an undeveloped forest or meadow) or where intersection conflicts are minimal and should not be used as a substitute for designing the road network to be safer. The result of this recommendation is mode separation between pedestrians and often faster moving electric mobility devices, while also achieving a more safely designed roadway, increasing cycling mode share and utility connection for commuter cyclists. This approach is supported by Chapter 1000 of the California Highway Design Manual[1]. During project design, implementers should review alternatives that seek to meet all user needs by increasing safety, addressing connectivity gaps, and considering constructability.

Project priority tiers were developed in collaboration with each implementing agency, community outreach, stakeholder input, TRPA Vision Zero Safety Strategy data analyses, and existing projects carried forth from the 2018 ATP.

Not all projects listed in this section have been prioritized and added to the Environmental Improvement Program (EIP) priority list at this time. Active Transportation Plan projects may be added to the EIP priority list as part of the Regional Transportation Plan process.

[1] Chapter 1000 CA Highway Design Manual – Bicycle Transportation Design https://dot.ca.gov/-/media/dot-media/programs/design/documents/chp1000.pdf

STATE ROUTE 89 / STATE ROUTE 28 CORRIDOR



Physical Geographic Description: This corridor starts at the northern boundary of Sugar Pine Point State Park and extends to the California/Nevada state line in Crystal Bay. The corridor includes both Placer and El Dorado counties, and contains the Tahoma, Homewood, Tahoe City, Carnelian Bay, and Kings Beach areas.

Context Relevant Plans & Studies:

- Resort Triangle Transportation Plan (2021)
- North Lake Tahoe Community Wayfinding Signage Design Standards Manual
- Tahoe Basin Area Plan (2023)
- Tahoe City Road Safety Audit (2015)
- Fanny Bridge / SR 89 Community Revitalization Project

Additional Corridor Considerations:

Community Input: Public outreach in this corridor yielded desire for more robust on-street facilities, better crossing treatments where Class 1 trails intersect the state highway, as well as more robust pedestrian infrastructure (sidewalks, lighting) within the town centers. Concern over electric bicycles was expressed, in that low-stress on-street facilities should be made, or space to accommodate both e-bikes and pedestrians should be provided. The town centers within this corridor, as with many of Tahoe's town centers, are positioned to be very bicycle and pedestrian friendly. Thoughtful design should be incorporated to ensure these modes are supported.

New SR 89 Bridge & Bike Trail. Rendering: Tahoe Transportation District

FIGURE 4-1: SR 89/28 CORRIDOR – EXISTING AND PROPOSED ACTIVE TRANSPORTATION NETWORK

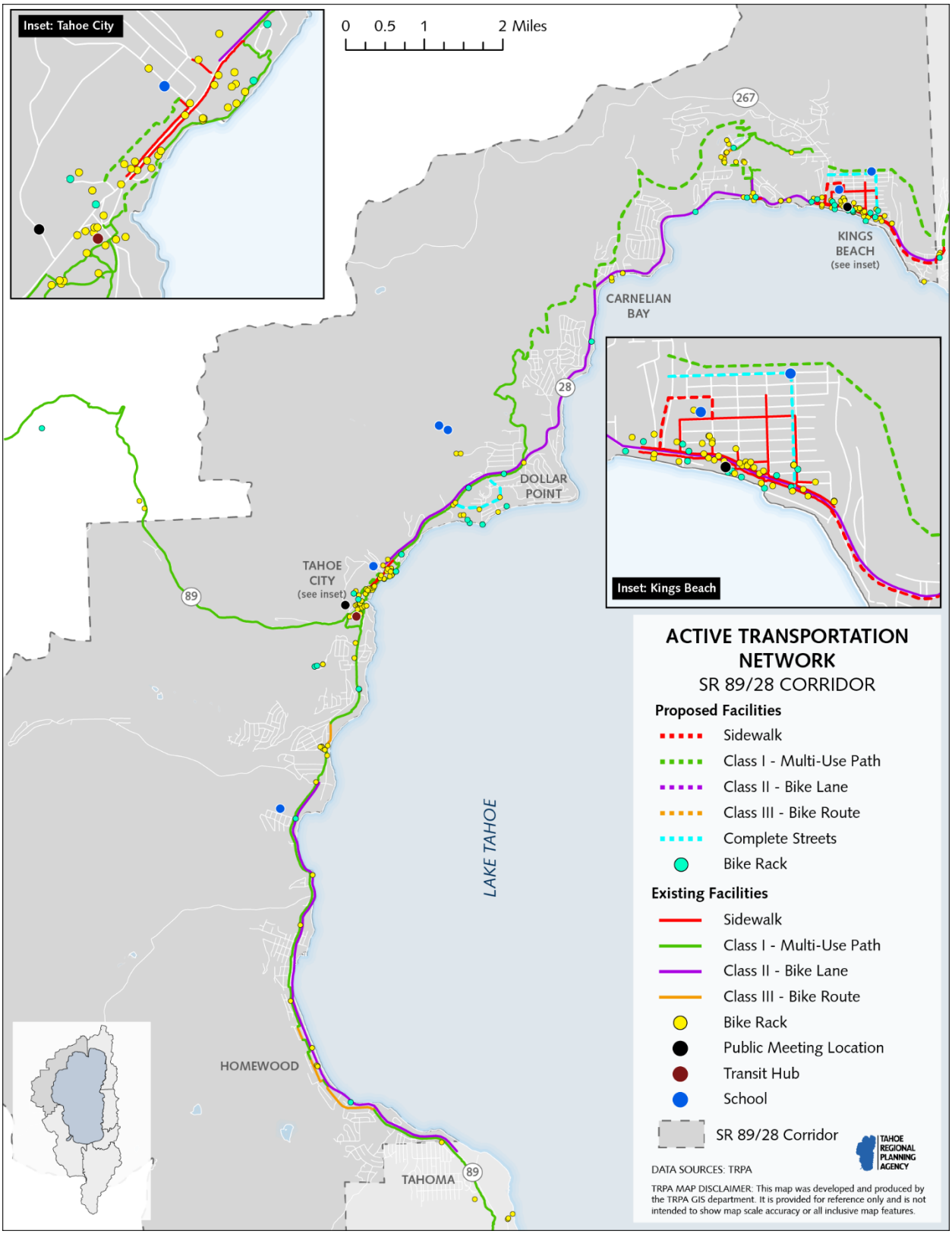
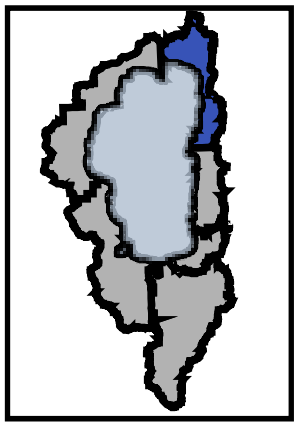


TABLE 4-1 SR 89/28 CORRIDOR PROJECT LIST:

PRIORITY TIER	EIP #	PROJECT	IMPLEMENTER	MILES	ESTIMATED COST	PHASE	EST. COMPLETE YEAR
1	01.01.01.0168	Kings Beach Western Approach – Sidewalks	Placer County	0.26	$14,222,000	Planning/Design	2026
1	NOT LISTED	Stateline to Kings Beach Sidewalks	California Department of Transportation	0.8	$184,000	Planning	2040
1	03.02.02.0003	N Tahoe Trail (Carnelian Ave to N Tahoe Park - 1)	Placer County	2.6	$26,020,000	Planning/Design	2030
1	NOT LISTED	N Tahoe Trail (Carnelian Ave to Carnelian Bay – 2)	Placer County	1.77	$17,700,000	Planning/Design	2040
1	01.01.01.0086	N Tahoe Trail (Dollar Point to Carnelian Bay - 2)	Placer County	1.73	$7,730,000	Planning/Design	2025
1	03.02.02.0089	Tahoe City Lakeside Trail Missing Link	Placer County	0.19	$1,000,000	Planning/Design	2024
1	NOT LISTED	Fox & Speckled Complete Streets	Placer County	1.16	$20,010,000	Planning/Design	2035
1	NOT LISTED	Dolly Varden/Deer St Sidewalks	Placer County	0.31	$62,000	Planning	2040
2	NOT LISTED	Kings Beach to Stateline Shared Use Path	Placer County	1.88	$36,754,000	Planning/Design	2045
2	NOT LISTED	Tahoe City Golf Course Shared-use Path	Placer County	0.35	$4,025,000	Planning/Design	2028
2	NOT LISTED	TCPUD Multi-Use Trail System Reconstruction and Safety Enhancement Project	Tahoe City Public Utility District	13.1	$11,707,200	Implementation	2030
2	NOT LISTED	Lake Forest Rd Complete Streets	Placer County	0.9	$15,525,000	Planning/Design	2035
3	NOT LISTED	North Tahoe Regional Trail (Segment 4)	Placer County	0.53	$6,095,000	Planning/Design	2035
3	NOT LISTED	Donner Rd Bike Route	North Tahoe Public Utility District	0.22	$1,265	Planning/Design	2035

NV STATE ROUTE 28 NATIONAL SCENIC BYWAY CORRIDOR

Physical Geographic Description: This corridor includes State Route 28 starting from the intersection with U.S. Highway 50 in the southeast to the state line in Crystal Bay. This corridor is located in Washoe County and Carson City. Incline Village, Sand Harbor State Park, and parts of State Route 431 are also located in this corridor.



Context Relevant Plans & Studies:

- Mount Rose State Route 431 Corridor Management Plan (2015)
- State Route 28 Corridor Management Plan (2013)
- Incline Village Commercial and Tourist Community Plans
- Washoe County Master Plan
- Washoe County Tahoe Transportation Plan (2023)
- Washoe County Tahoe Area Plan (2023)
- SR 28 National Scenic Byway Corridor Signage Master Plan (2016)

Additional Corridor Considerations:

Community Input: Stakeholders in this region were mostly focused on pedestrian safety, as well as destination management around popular recreation sites. Cars parked in the shoulder on the state highway, often with no dedicated pedestrian infrastructure can make for unsafe conditions. Also incorporated into this plan is the work conducted on Washoe County's Tahoe Transportation Plan. The Washoe County Tahoe Transportation Plan underwent extensive community engagement that yielded the bulk of the priority project list identified in this plan.

Proposals include:

1. SR 28 Class I Crystal Bay to Incline
2. SR28 Preston to Northwood Bike Path

FIGURE 4-2: NV SR 28 CORRIDOR – EXISTING AND PROPOSED ACTIVE TRANSPORTATION NETWORK

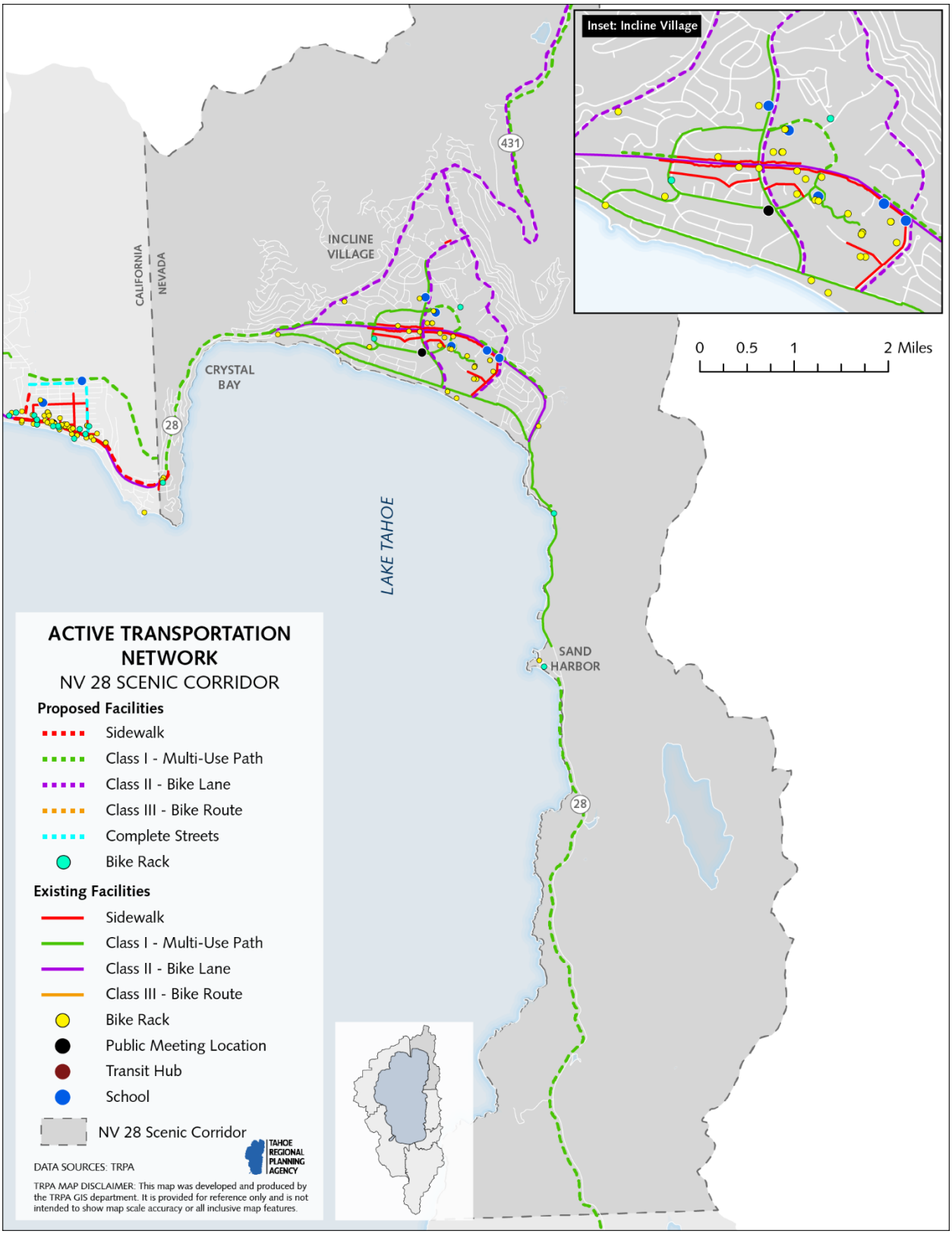
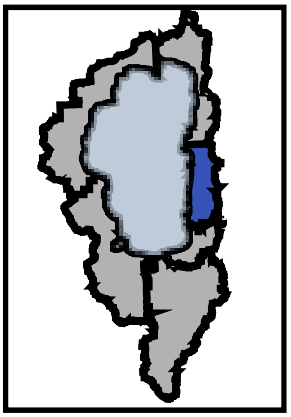


TABLE 4-2 NV SR 28 CORRIDOR PROJECT LIST:

PRIORITY	EIP #	PROJECT	IMPLEMENTER	MILES	ESTIMATED COST	PHASE	EST. COMPLETE YEAR
1	NOT LISTED	Northwood Blvd Bike path	Washoe County	0.61	$7,015,000	Planning/Design	2035
1	03.02.01.0061	Sand Harbor to Thunderbird Cove Bike Path	Tahoe Transportation District	1.21	$46,000,000	Planning/Design	2027
1	03.02.02.0062	SR 28 Class I Crystal Bay to Incline	Washoe County	2.63	$16,200,000	Planning/Design	2040
1	03.02.02.0072	SR28 Preston to Northwood Bike Path	Washoe County	0.3	$3,450,000	Planning	2030
1	NOT LISTED	Village Blvd Bike Lanes	Washoe County	1.92	$331,200	Planning/Design	2035
2	NOT LISTED	SR28 Class 1 Country Club to Glen	Washoe County	0.26	$2,990,000	Planning	2035
2	NOT LISTED	SR28 Class 1 Country Club to Sweetwater	Washoe County	0.67	$7,705,000	Planning	2035
2	NOT LISTED	Country Club Dr Bike Lanes	Washoe County	2.68	$462,300	Planning/Design	2035
2	NOT LISTED	Mt. Rose Hwy Bike Lanes	Nevada Department of Transportation	6.63	$1,906,125	Planning/Design	2045
2	03.02.01.0017	Thunderbird Cove to Spooner Bike Path	Tahoe Transportation District	5.93	$100,810,000	Planning/Design	2040
3	NOT LISTED	Mt. Rose Bike Path	Nevada Department of Transportation	2.54	$29,210,000	Planning/Design	2045

U.S. HIGHWAY 50 EAST SHORE CORRIDOR



Physical Geographic Description: This corridor starts at the intersection of U.S. Highway 50 and State Route 28 and extends to roughly 950 feet northwest of Elks Point Road. This latter point is the northern end of the Round Hill Mall commercial center, and marks where the predominantly rural, low-density areas to the north transition to the predominantly developed areas to the south. This corridor is located in Douglas County.

Context Relevant Plans & Studies:

- Tahoe Douglas Area Plan
- Douglas Co Safe Routes to School Action Plan (2023)
- Douglas Co Trails Strategy (2023)
- Round Hill Community Plan
- Complete Street Focused Road Safety Assessment Report (2016)

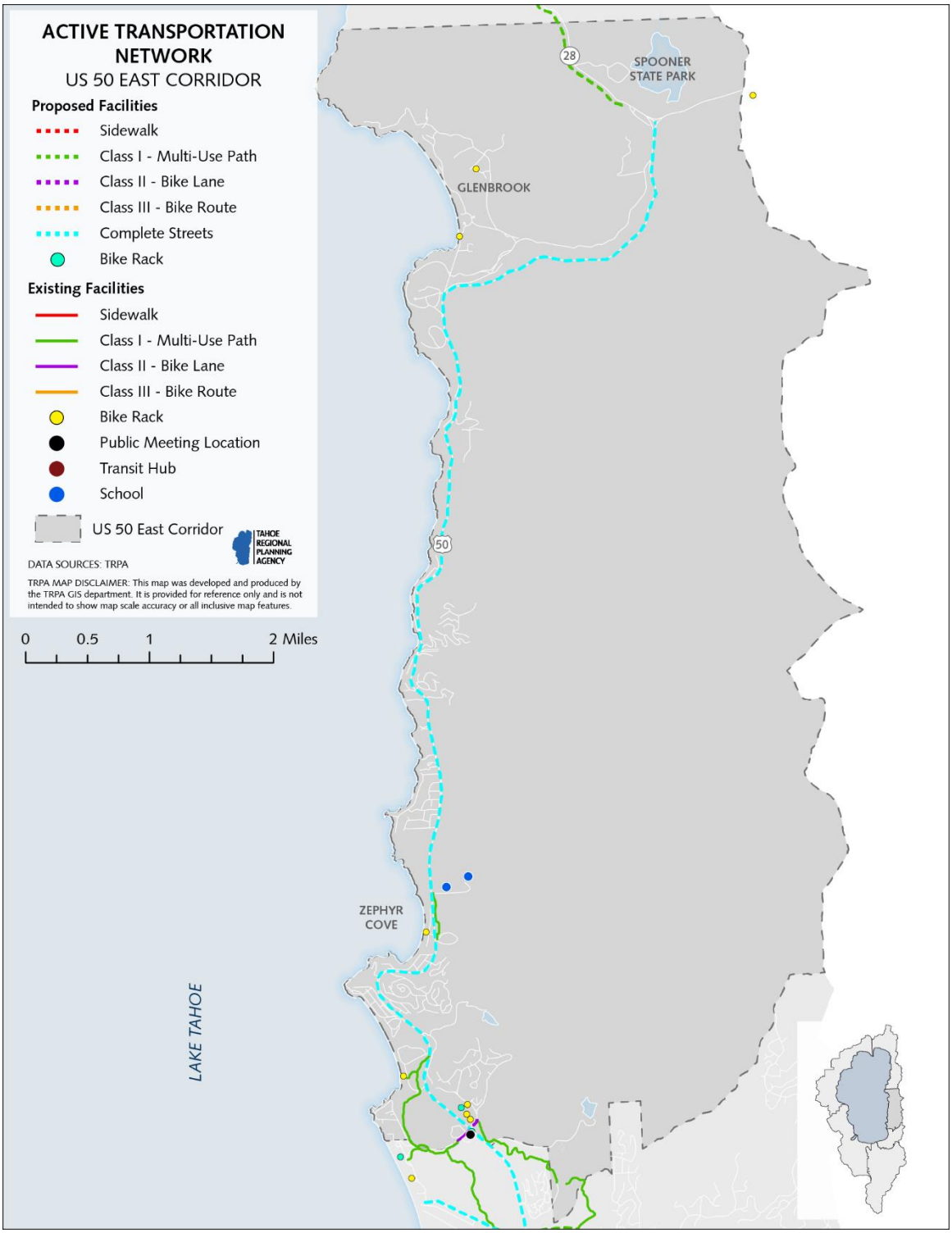
Additional Corridor Considerations: *Community Input:* Stakeholders largely agree that the US 50 East Shore corridor is a very dangerous stretch of highway for all modes of travel. Due to high-speeds, four-lane highway, sprawling land use, and lack of bicycle and pedestrian infrastructure, walking, biking, and rolling is not the default travel choice. NDOT recently has undergone the US 50 East Shore Corridor Management Plan, and the community received the study team's draft recommendations with mixed reviews. Limited location lane reductions, proposed to help reduce vehicle speeds, make for safer pedestrian crossings, safer turning movements for vehicles out of driveways and neighborhoods, and to provide right-of-way space for bicycle facilities at locations with an abnormally high rate of fatal and severe injury crash occurrences (of all modes) were a part of the early draft analyses *and are not being pursued as a response to concerns voiced from the community*. As of April 2024, the draft recommendations, that do not include lane reductions, focus on parking management, advanced-warning signs, closing gaps in the active transportation network and intersection improvements. While lane reductions implemented properly have proven benefits to increasing roadway safety for all users, these difficult conversations are needed and continue to be had, as implementers strive to deliver on the desires of the community to have safe streets that support a variety of modes[2].

Proposals include:

1. Complete streets study at "hot spot" (high rates of collisions) locations on US 50 East Shore
2. Stateline to Stateline Bikeway (multi phased – focus on Zephyr Cove to Round Hill Pines)

[2] Special care should be taken when implementing lane reconfigurations regarding evacuation management. Class 1 trails built to withstand heavy vehicles, wide enough to convert into a travel lane or emergency vehicle access, as well as implementing mountable/rolled curb, or simply paint, can capture the safety benefits of lane repurposing while retaining the existing roadway carrying capacity in the event of an evacuation. Directional capacity can even be increased if counterflow traffic control is planned for and implemented in the event of an evacuation. More information on road reconfigurations can be found at: https://highways.dot.gov/safety/proven-safety-countermeasures/road-diets-roadway-reconfiguration

FIGURE 4-3: U.S. 50 EAST SHORE CORRIDOR - EXISTING AND PROPOSED ACTIVE TRANSPORTATION NETWORK


ACTIVE TRANSPORTATION NETWORK
US 50 EAST CORRIDOR
Proposed Facilities
Sidewalk
Class I - Multi-Use Path
Class II - Bike Lane
Class III - Bike Route
Complete Streets
Bike Rack
Existing Facilities
Sidewalk
Class I - Multi-Use Path
Class II - Bike Lane
Class III - Bike Route
Bike Rack
Public Meeting Location
Transit Hub
School
US 50 East Corridor
TAHOE REGIONAL PLANNING AGENCY
DATA SOURCES: TRPA
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 0.5 1 2 Miles
SPOONER STATE PARK
28
GLENBROOK
50
ZEPHYR COVE
LAKE TAHOE

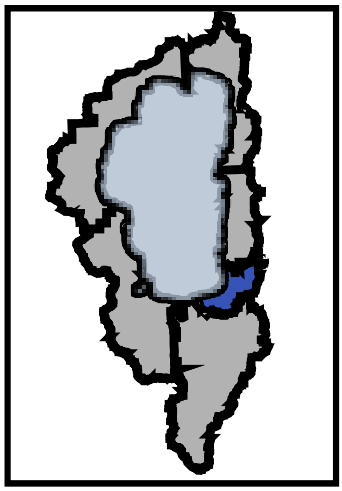
Note: Complete Streets alignment on map simply follows the US 50 roadway. Further study is needed to understand where and if a Class 1 trail, or any other improvement facility would be appropriate. All alignments shown in the plan are conceptual.

TABLE 4-3 U.S. 50 EAST SHORE CORRIDOR PROJECT LIST:

PRIORITY	EIP #	PROJECT	IMPLEMENTER	MILES	ESTIMATED COST	PHASE	EST. COMPLETE YEAR
1	NOT LISTED	Elks Point Rd Bike Lane Extension	Douglas County	0.09	$8,280	Planning/Design	2035
2	03.02.01.0032	Stateline to Stateline Bikeway D, E, F	Nevada Department of Transportation	11.39	$150,000,000	Planning/Design	2045

Conceptual Stateline to Stateline Bikeway: SR 28 National Scenic Byway Corridor Management Plan

U.S. 50 SOUTH SHORE CORRIDOR

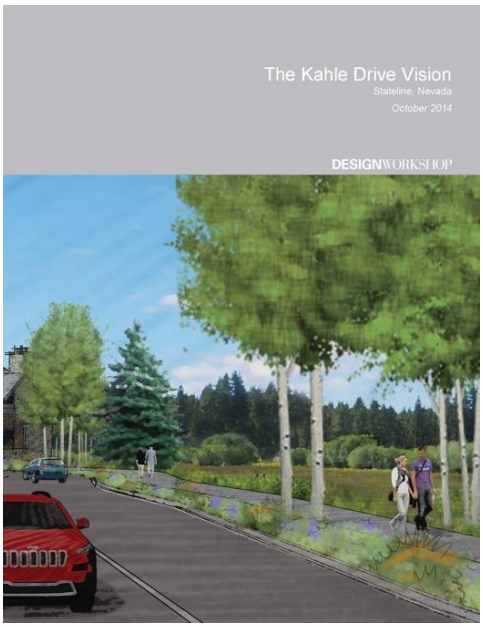


Physical Geographic Description: This corridor starts at U.S. Highway 50 from roughly 950 feet northwest of Elks Point Road in Douglas County to the Upper Truckee River Bridge (just west of River Street), in the City of South Lake Tahoe. The corridor also includes Pioneer Trail east of the Trout Creek Bridge (just northeast of Golden Bear Avenue) and State Route 207 (Kingsbury Grade) west of Pine Ridge Drive.

Context Relevant Plans & Studies:

- Tahoe Douglas Area Plan
- South Shore Area Plan (2013)
- Tourist Core Area Plan
- South Shore Wayfinding Plan
- Lake Tahoe Unified School District Safe Routes to School Master Plan (2015)
- South Tahoe Middle School Area Connectivity Plan (2015)
- Kahle Drive Vision (2014) and Complete Street Project (2022)
- U.S. Highway 50 Road Safety Audit (2018)

Additional Corridor Considerations:



Community Input: Stakeholders in previous outreach shaped a variety of Class I/Shared-use path options including updated pedestrian infrastructure and midblock crossings, as well as lighting to address safety concerns that are soon to be constructed. Beyond the Class 1 network, South Lake Tahoe residents largely felt that the on-street network, particularly US 50 and SR 89 could be made to be lower stress and have more of a "main street" feel.

The focus on reducing the level of stress of US 50 has many potential benefits. Increased safety for all modes through design features, while encouraging residents and visitors to walk, bike or roll more would be in-line with the region's goals to reduce vehicle miles traveled (VMT) as well as creating economically vibrant corridors that support businesses, public health, and thriving communities. Many of these initiatives and project implementations are currently underway by various agencies, including the Nevada Tahoe Resource Conservation District, Nevada Department of Transportation, City of South Lake Tahoe, Caltrans, TRPA, and Tahoe Transportation District alongside local and regional stakeholders.

FIGURE 4-4: U.S. 50 SOUTH SHORE CORRIDOR – EXISTING AND PROPOSED ACTIVE TRANSPORTATION NETWORK

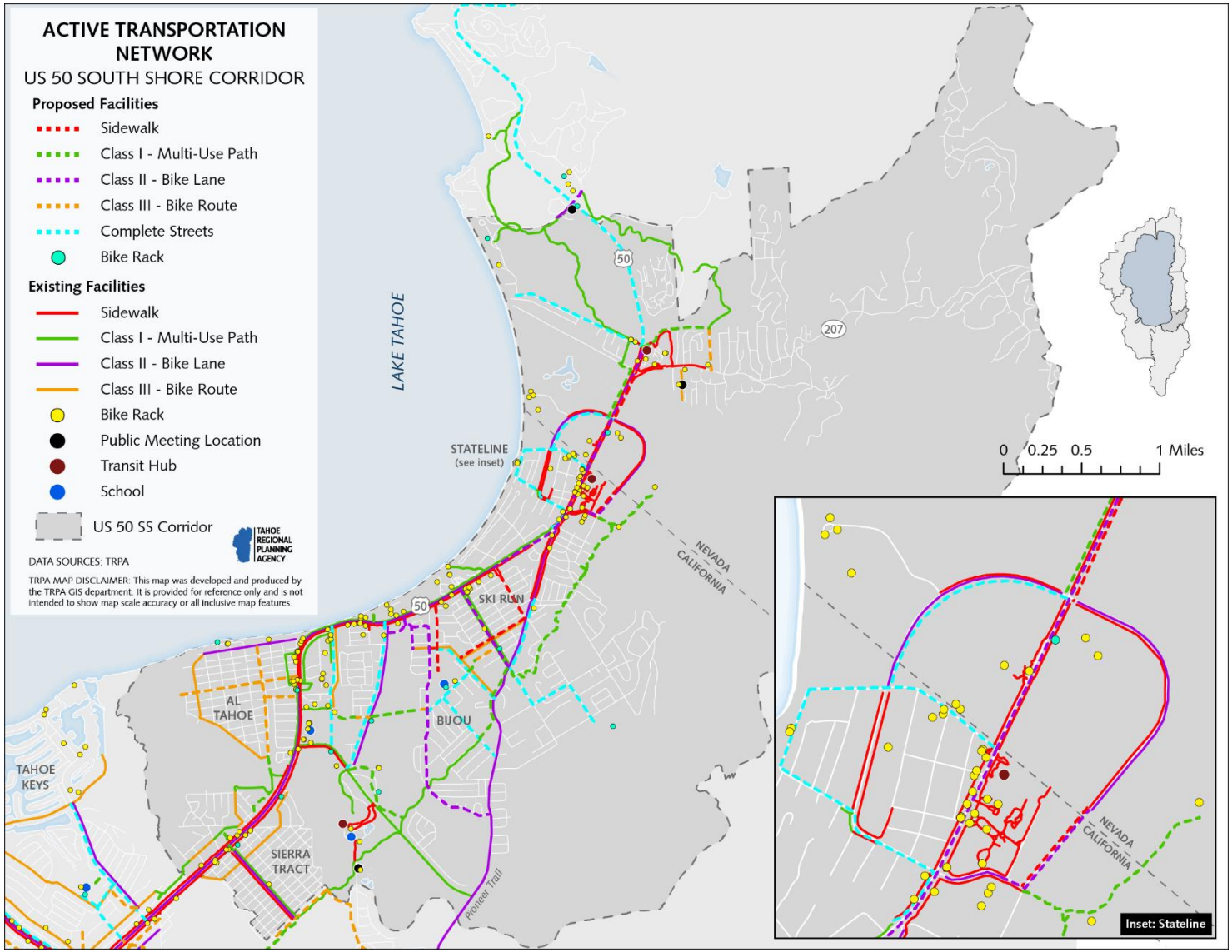
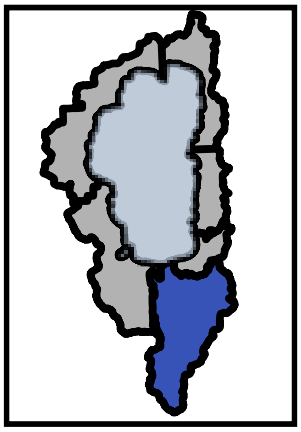


TABLE 4-4 U.S. 50 SOUTH SHORE CORRIDOR PROJECT LIST:

PRIORITY	EIP #	PROJECT	IMPLEMENTER	MILES	ESTIMATED COST	PHASE	EST. COMPLETE YEAR
1	03.02.02.0058	Kingsbury to Stateline Sidewalk	Douglas County	0.3	$500,000	Planning/Design	2035
1	03.02.02.0092	Bijou Bike Park Connector	City of South Lake Tahoe	0.57	$1,849,056	Planning/Design	2025
1	03.02.02.0055	Laura Dr to Stateline Bike Path	Tahoe Transportation District	0.42	$4,830,000	Planning/Design	2030
1	03.02.02.0095	South Tahoe Greenway Phase 1c	California Tahoe Conservancy	0.54	$9,500,000	Planning/Design	2028
1	NOT LISTED	Hwy 50 at Stateline Bike Lanes (NV)	Nevada Department of Transportation	0.86	$247,250	Planning/Design	2035
1	03.02.02.0093	Johnson Blvd Complete Streets	City of South Lake Tahoe	0.98	$4,346,450	Planning/Design	2028
1	03.02.01.0055	Kahle Drive Complete Street	Nevada Tahoe Conservation District	0.88	$3,631,339	Planning/Design	2025
1	03.02.01.0060	Park Avenue and Lake Tahoe Blvd Complete Streets	City of South Lake Tahoe	0.73	$6,500,000	Planning/Design	2030
1	03.02.02.0097	Spruce and Blackwood SRTS	City of South Lake Tahoe	0.89	$15,352,500	Planning/Design	2030
1	03.02.02.0096	Stateline Avenue Complete Streets Project	City of South Lake Tahoe	0.45	$6,750,000	Planning/Design	2030
1	NOT LISTED	Lake Pkwy South Sidewalks	City of South Lake Tahoe	0.22	$44,000	Planning	2040
1	03.01.02.0030	Van Sickle Phase III Shared Use Trails	California Tahoe Conservancy	0.44	$6,000,000	Planning/Design	2025
1	NOT LISTED	Herbert Ave Complete Streets	City of South Lake Tahoe	0.51	$7,650,000	Planning/Design	2040
2	NOT LISTED	Herbert Ave Sidewalks	City of South Lake Tahoe	0.47	$75,200	Planning	2045
2	03.01.01.0005	Alta Mira Public Access Improvements	California Tahoe Conservancy	0.08	$8,000,000	Implementation	2030
2	NOT LISTED	Johnson Blvd to Lester Ave bike path connector	City of South Lake Tahoe	0.32	$3,680,000	Planning/Design	2045
2	03.02.02.0094	Palmira Ave Connector	City of South Lake Tahoe	0.14	$1,370,000	Planning/Design	2027

2	NOT LISTED	Fairway Dr Bike Lanes	City of South Lake Tahoe	0.37	$34,040	Planning/Design	2035
2	NOT LISTED	Glenwood Way bike lanes	City of South Lake Tahoe	1.6	$147,200	Planning/Design	2045
2	NOT LISTED	Lake Pkwy South Bike Lanes	City of South Lake Tahoe	0.27	$46,575	Planning/Design	2045
2	NOT LISTED	Ski Run Blvd Bike Lanes	City of South Lake Tahoe	0.59	$101,775	Planning/Design	2035
2	03.02.01.0007	Lake Pkwy Complete Streets	Tahoe Transportation District	0.52	$8,970,000	Planning/Design	2027
2	03.02.02.0076	Greenway Phase 3 – Ski Run Blvd to Van Sickle	California Tahoe Conservancy	1.45	$25,000,000	Planning	2032
2	NOT LISTED	Complete street to Cal Base	City of South Lake Tahoe	0.9	$13,500,000	Planning	2050
2	NOT LISTED	Spruce connector bridge	City of South Lake Tahoe	0.08	$1,360,000	Planning	2030
2	NOT LISTED	Link Road to Sussex Ave	California Tahoe Conservancy	0.16	$6,000,000	Planning	2032
3	NOT LISTED	Spruce bike route	City of South Lake Tahoe	0.15	$750	Planning/Design	2030
3	NOT LISTED	Marlette Cir to Rufus Allen class I connector	City of South Lake Tahoe	0.1	$1,150,000	Planning/Design	2035
3	NOT LISTED	Oakland Ave class I bridge over trout creek	City of South Lake Tahoe	0.12	$2,346,000	Planning/Design	2045
3	NOT LISTED	Pine Ridge Dr to Kahle Class I	Douglas County	0.48	$5,520,000	Planning/Design	2045
3	NOT LISTED	Hwy 50 at Stateline Bike lanes (CA)	California Department of Transportation	0.89	$255,875	Planning/Design	2035
3	NOT LISTED	Los Angeles Ave bike route	City of South Lake Tahoe	0.19	$1,093	Planning/Design	2035
3	NOT LISTED	Marlette Cir bike route	City of South Lake Tahoe	0.1	$575	Planning/Design	2035
3	NOT LISTED	Oakland Ave bike route	City of South Lake Tahoe	0.71	$4,083	Planning/Design	2045
3	NOT LISTED	Pineridge Dr Bike route	Douglas County	0.27	$1,553	Planning/Design	2045
3	NOT LISTED	San Francisco Ave bike route	City of South Lake Tahoe	0.75	$4,313	Planning/Design	2045
3	NOT LISTED	Victor St bike route	City of South Lake Tahoe	0.05	$288	Planning/Design	2035
3	03.02.02.0080	Rufus Allen Blvd Complete Streets	City of South Lake Tahoe	0.76	$13,110,000	Deferred	2035
3	NOT LISTED	Tamarack Ave Sidewalks	City of South Lake Tahoe	0.48	$96,000	Planning	2050
3	NOT LISTED	Wildwood Ave Sidewalks	City of South Lake Tahoe	0.32	$64,000	Planning	2050
Construction 2024	03.02.02.0078	Pioneer Trail Sidewalk	City of South Lake Tahoe	0.46	$5,118,028	Implementation	2024

MEYERS / Y CORRIDOR



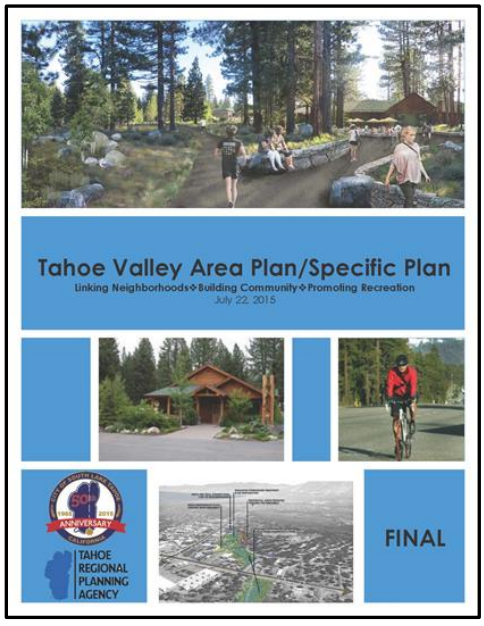
Physical Geographic Description: This corridor begins at US Highway 50 west of the Upper Truckee River in the City of South Lake Tahoe and extends to just north of the South Tahoe "Y" and south to include Meyers, located in El Dorado County.

Context Relevant Plans & Studies:

- Meyers Area Plan (2018)
- Tahoe Valley Area Plan (2015)
- Tahoe Valley Area Plan Bicycle Facility Evaluation (2014)
- Lake Tahoe Unified School District Safe Routes to School Master Plan (2015)
- South Tahoe Middle School Area Connectivity Plan (2015)
- Meyers, El Dorado County, California Road Safety Audit (2016)
- U.S. Highway 50 Road Safety Audit (2018 & 2023)

Additional Corridor Considerations:

Community Input: Stakeholders suggested a variety of Class I / Shared-use paths. Connections from Meyers to the City of South Lake Tahoe were high community priorities. As with all of our corridors, potential wildfire evacuations were a concern, and special care must be taken to plan for these evacuations, while providing low-stress facilities for people who would like to walk or bicycle to their destinations.



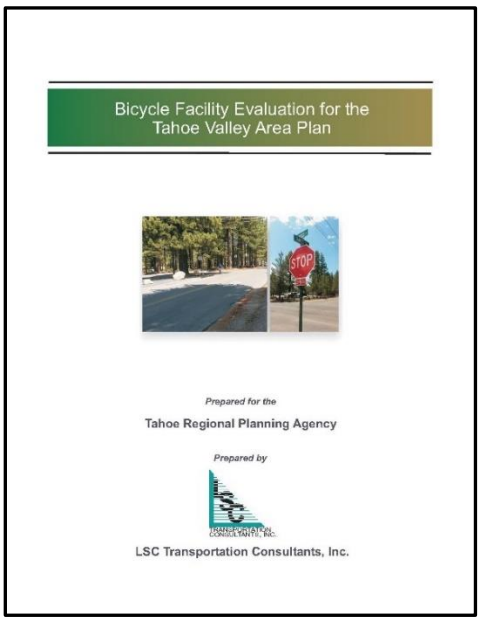

Bicycle Facility Evaluation for the Tahoe Valley Area Plan
Prepared for the
Tahoe Regional Planning Agency
Prepared by
LSC Transportation Consultants, Inc.

FIGURE 4-5: MEYERS Y CORRIDOR – EXISTING AND PROPOSED ACTIVE TRANSPORTATION NEWTORK

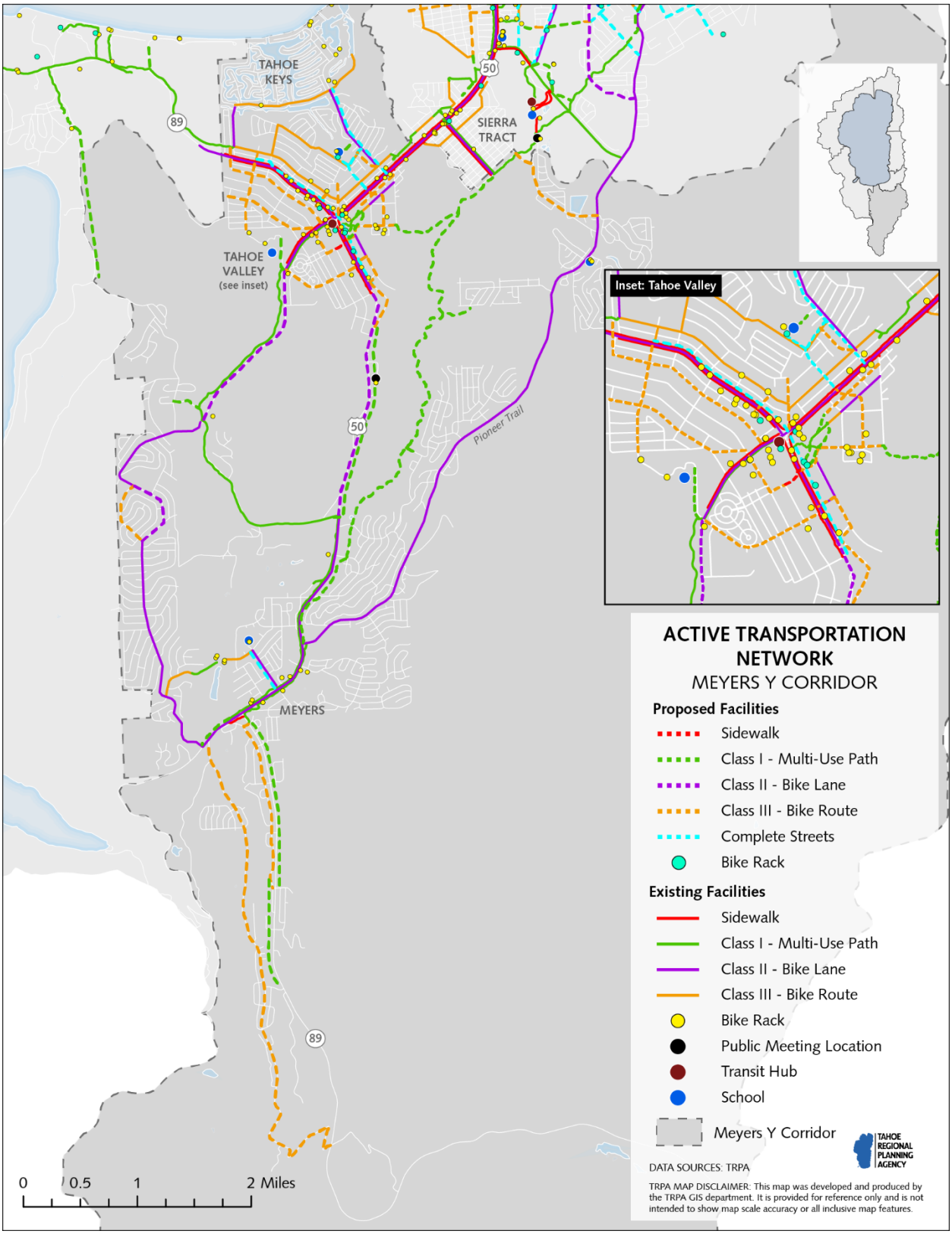
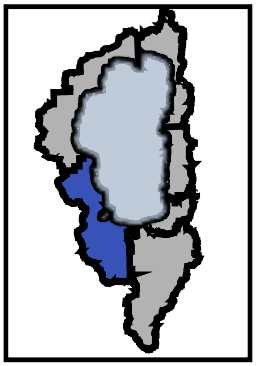


TABLE 4-5 MEYERS Y CORRIDOR PROJECT LIST:

PRIORITY	EIP #	PROJECT	IMPLEMENTER	MILES	ESTIMATED COST	PHASE	EST. COMPLETE YEAR
1	03.02.02.0085	Johnson Meadow Bridge	El Dorado County	1.14	$9,153,626	Planning/Design	2027
1	NOT LISTED	Lake Tahoe Blvd bike lanes	El Dorado County	1.59	$274,275	Planning	2030
1	01.01.01.0033	Tahoe Valley Greenbelt Class 1 Paths	City of South Lake Tahoe	0.51	$15,000,000	Implementation	2025
1	03.02.02.0022	Third St Complete Streets	City of South Lake Tahoe	0.39	$6,727,500	Planning/Design	2035
1	NOT LISTED	US Hwy 50 Complete Streets Improvements	California Department of Transportation	1.6	$2,300,000	Planning/Design	2035
2	NOT LISTED	B Street Overpass	California Department of Transportation	0.12	$8,050,000	Planning/Design	2035
2	03.02.01.0054	Fallen Leaf Road Bike Path	El Dorado County	1.56	$3,050,000	Planning/Design	2027
2	NOT LISTED	Greenway 4a - Pioneer to Elks Club	El Dorado County	1.2	$13,800,000	Planning	2028
2	NOT LISTED	Greenway 4b - Elks Club to Nottaway	El Dorado County	1	$11,500,000	Planning	2030
2	NOT LISTED	Greenway 4c - Nottaway to Golden Bear	El Dorado County	1.74	$20,010,000	Planning	2032
2	NOT LISTED	Greenway 4d - Golden Bear to Johnson	El Dorado County	1.12	$12,880,000	Planning	2032
2	NOT LISTED	Hwy 50 to NUT Bike Path	California Department of Transportation	0.34	$4,140,000	Planning/Design	2035
2	NOT LISTED	Viking Rd Bike Path	City of South Lake Tahoe	0.28	$3,220,000	Planning/Design	2045
2	NOT LISTED	Lake Tahoe Blvd bike lane - gap closure	El Dorado County	0.71	$65,320	Planning/Design	2032
2	01.01.01.0033	Barton Ave Bike Route	City of South Lake Tahoe	0.16	$920	Implementation	2025
2	NOT LISTED	Black Bart bike route	El Dorado County	1.02	$5,865	Planning/Design	2035
2	NOT LISTED	Kyburz Ave Bike Route	City of South Lake Tahoe	0.48	$2,760	Planning/Design	2035
2	NOT LISTED	Mt. Rainier Bike Route	El Dorado County	0.58	$3,335	Planning/Design	2025

2	NOT LISTED	S Upper Truckee Rd Bike Route	El Dorado County	4.66	$26,795	Planning/Design	2030
2	01.01.01.0033	South Ave Bike Route	City of South Lake Tahoe	0.52	$2,990	Implementation	2025
2	NOT LISTED	Tahoe Keys Blvd Complete Streets	City of South Lake Tahoe	0.9	$15,525,000	Planning/Design	2040
2	03.02.02.0059	Washington Ave Complete Streets	City of South Lake Tahoe	0.19	$3,277,500	Planning/Design	2040
3	03.02.02.0028	Christmas Valley Bike Path	El Dorado County	2.44	$28,060,000	Deferred	2030
3	03.02.02.0071	Hwy 50 bike path to airport	City of South Lake Tahoe	0.4	$4,600,000	Planning/Design	2045
3	NOT LISTED	James Ave Class I connection	City of South Lake Tahoe	0.03	$345,000	Planning/Design	2032
3	03.02.02.0065	Sawmill to City Bike Path	California Department of Transportation	1.39	$15,985,000	Deferred	2026
3	NOT LISTED	Tahoe Mtn to Lake Tahoe Blvd Class I Connector	El Dorado County	0.25	$2,875,000	Planning/Design	2045
3	NOT LISTED	Wyoming Tahoe Valley Connector	City of South Lake Tahoe	0.06	$690,000	Planning/Design	2040
3	NOT LISTED	13th St Bike Route	City of South Lake Tahoe	0.58	$3,335	Planning/Design	2030
3	NOT LISTED	3rd St Bike Route to Barton	City of South Lake Tahoe	0.41	$2,358	Planning/Design	2035
3	NOT LISTED	B St/Tata Ln Bike Route	City of South Lake Tahoe	0.31	$1,783	Planning/Design	2035
3	NOT LISTED	Barbara Ave bike route	City of South Lake Tahoe	0.45	$2,588	Planning/Design	2035
3	NOT LISTED	Blitzen Rd bike route	El Dorado County	1.53	$8,798	Planning/Design	2045
3	NOT LISTED	C St Bike Route	City of South Lake Tahoe	0.1	$575	Planning/Design	2035
3	NOT LISTED	Julie Ln Bike Route	City of South Lake Tahoe	0.87	$5,003	Planning/Design	2030
3	NOT LISTED	Council Rock Dr bike route	City of South Lake Tahoe	0.22	$1,265	Planning/Design	2035
3	NOT LISTED	D St Bike Route	City of South Lake Tahoe	0.69	$3,968	Planning/Design	2035
3	NOT LISTED	Dunlap Dr Bike Route	City of South Lake Tahoe	0.27	$1,553	Planning/Design	2035
3	NOT LISTED	E St Bike Route	City of South Lake Tahoe	0.11	$633	Planning/Design	2035
3	NOT LISTED	Glorene Ave Bike Route	City of South Lake Tahoe	1.14	$6,555	Planning/Design	2030
3	NOT LISTED	Melba Dr Bike Route	City of South Lake Tahoe	0.19	$1,093	Planning/Design	2035
3	NOT LISTED	US Hwy 50 bike lane Meyers to City	California Department of Transportation	2.01	$606,625	Planning/Design	2035
3	NOT LISTED	5th Ave Bike Route	City of South Lake Tahoe	0.15	$750	Planning	2030
Construction 2024	03.02.02.0006	Apache Avenue Complete Streets	El Dorado County	0.4	$4,058,000	Planning/Design	2026

STATE ROUTE 89 RECREATION CORRIDOR



Physical Geographic Description: This corridor begins at the northern edge of the City of South Lake Tahoe just past the South Tahoe "Y" and extends to the north into El Dorado County, just past Meeks Bay.

Context Relevant Plans & Studies:

- SR -89 Cascade to Rubicon Bay Bikeway Study
- West Shore Area General Plan
- El Dorado County General Plan
- SR 89 Recreation Corridor Management Plan (Under Development)
- The Cascade to Meeks Trail Feasibility Study (2022)

Additional Corridor Considerations:

Community Input: The Cascade to Meeks Trail Feasibility Study, completed in 2022, examined potential alignments for a Class I trail between Meeks Bay and the current terminus of the Tahoe Trail at Spring Creek/Cascade Lake. Tahoe residents, homeowners in the corridor, conservation and recreation organizations provided input throughout the process to identify buildable segments. A multi-agency stakeholder steering committee including California State Parks, TRPA, Caltrans, El Dorado County, the Washoe Tribe, and the US Forest Service have begun planning and environmental analysis for the trail, focused on DL Bliss and Emerald Bay State Parks.

At Meeks Bay, A Class I trail is planned through the recreation site and campground. The Highway 89 bridge over Meeks Creek will also be replaced to accommodate stream restoration and trail connectivity north and south, eventually closing the gap between Tahoe's west shore and South Lake Tahoe.

FIGURE 4-6: SR 89 RECREATION CORRIDOR – EXISTING AND PROPOSED ACTIVE TRANSPORTATION NETWORK

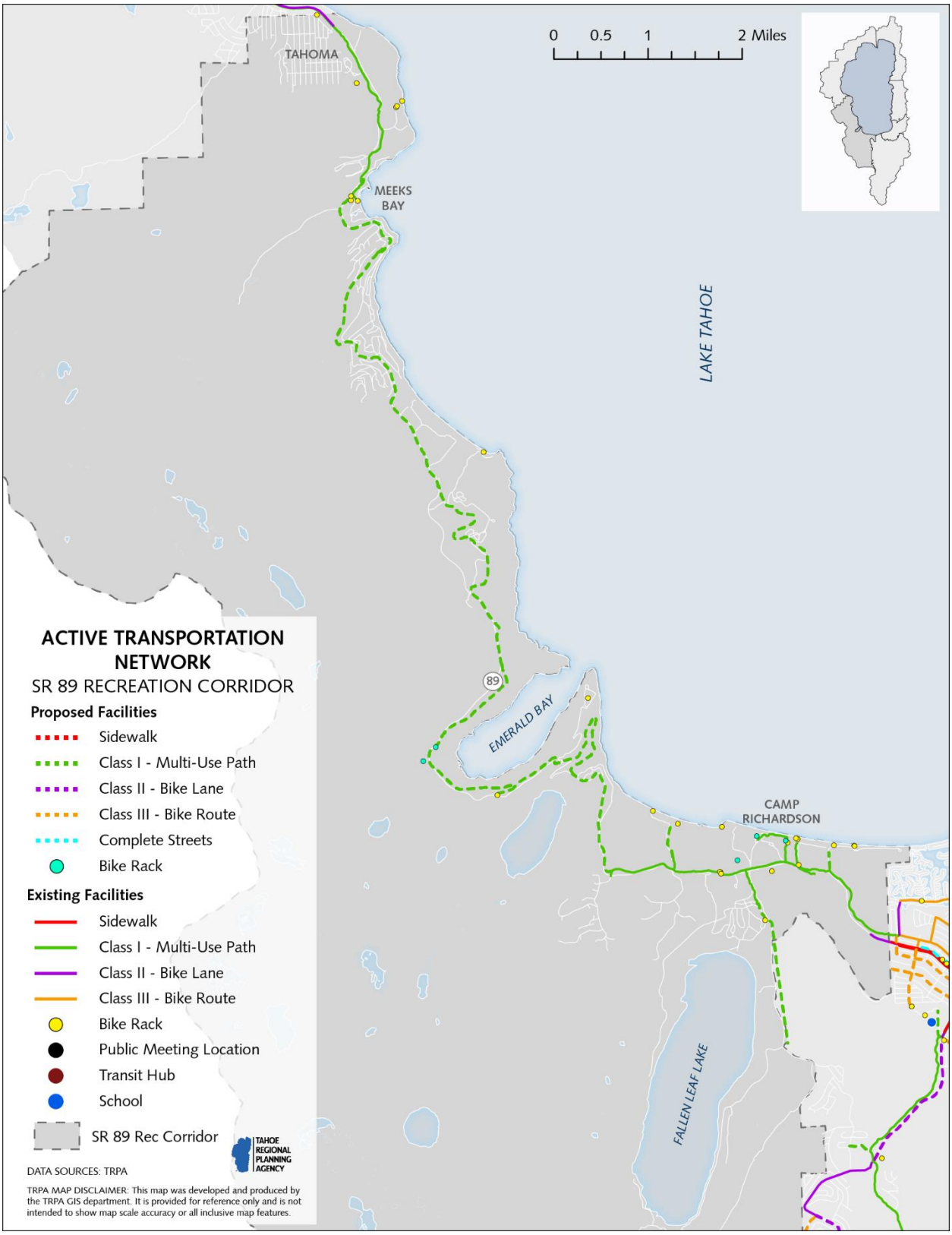


TABLE 4-6 SR 89 RECREATION CORRIDOR PROJECT LISTS:

PRIORITY	EIP #	PROJECT	IMPLEMENTER	MILES	ESTIMATED COST	PHASE	EST. COMPLETE YEAR
2	03.02.02.0029	Baldwin Beach Bike Path	U.S. Forest Service - Lake Tahoe Basin Management Unit	0.36	$1,450,000	Implementation	2025
2	NOT LISTED	Cascade to Meeks Trail - Segment 1	Unknown	1.61	$11,772,259	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 2	Unknown	0.93	$13,084,385	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 3	Unknown	2.05	$12,780,296	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 4	Unknown	1.87	$37,258,815	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 5	Unknown	0.88	$7,930,359	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 6	Unknown	1.2	$35,062,182	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 7	Unknown	1.51	$35,355,831	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 8	Unknown	0.95	$94,426,500	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 9	Unknown	1.41	$35,186,430	Planning/Design	2050
2	NOT LISTED	Cascade to Meeks Trail - Segment 10	Unknown	1.49	$19,669,449	Planning/Design	2050
2	03.02.02.0030	Pope Beach Bike Path	U.S. Forest Service - Lake Tahoe Basin Management Unit	0.17	$1,955,000	Deferred	2030

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CHAPTER 5: PROGRAMS

Awareness programming is a major aspect of encouraging community members and visitors to use multi-modal methods of transportation. Successful programs require a joint effort between state departments of transportation, local jurisdictions, law enforcement, advocacy groups, and local organizations. Campaigns that include encouragement, education and awareness, evaluation, and enforcement all work together to increase active transportation, improve safety, and gather valuable community feedback. Agencies and organizations currently involved in awareness programs include:

Type of Organization	Organization Name	Location	Responsibility
Government & Agency Associations	Counties, CSLT, TMAs	Region-wide	Funding, staff time, materials
Public Safety	City of South Lake Tahoe Police Department	South Lake Tahoe	Funding, staff time, materials
	California Highway Patrol	California	
	Nevada Highway Patrol	Nevada	
Advocacy	Community Mobility Group	South Lake Tahoe	Volunteer time & program development
	Lake Tahoe Bicycle Coalition	Region-wide	Volunteer time & program development
	Tahoe Mountain Biking Association	South Lake Tahoe	Volunteer Time
	The League to Save Lake Tahoe	Region-wide	Funding, staff time, and materials
Education	NDOT Safe Routes to School Program	East Shore	Funding, staff time, program development
	NDOT Bicycle/Pedestrian Education Program	East Shore	Funding, staff time, program development
	School Districts	Region-wide	Funding, staff time, program development
	Lake Tahoe Community College	South Lake Tahoe	Funding, staff time, program development
	South Tahoe Environmental Education Coalition (STEEC)	South Lake Tahoe	Funding, staff time, program development
	North Tahoe Environmental Education Coalition (NTEEC)	North Lake Tahoe	Funding, staff time, program development
	Boys & Girls Club	South Lake Tahoe	Funding, staff time, program development

Table 5-1: Agencies Involved in Awareness Programming. Source: TMPO

5.1 ENCOURAGEMENT:

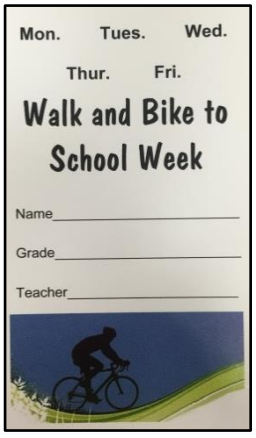
Encouragement to use active transportation as a method of travel can be conducted in many ways. Below are examples of existing and recommended programs that should be implemented.

Tahoe Bike Month

Since 2005, the Lake Tahoe Bicycle Coalition (LTBC) and TRPA, with support from other local and regional partners, organize the Tahoe Bike Month every year in June. The goal of Tahoe Bike Month is to encourage people regionwide to forego driving and instead bike as often as possible. Each year, hundreds of cyclists join teams or ride as individuals and record their total number of bicycle trips through the online site: http://tahoebikemonth.org. Sponsors also organize a variety of events, group rides, and incentive opportunities throughout the month to increase awareness and participation. In 2023, over 450 participants took 7,109 trips by bicycle racking up 52,789 miles and 3,749,683 vertical feet of elevation. The impact of Tahoe Bike Month on the environment each year is tremendous, preventing carbon dioxide emissions, and encouraging the community to opt for two-wheels instead of four.

June 30, 2015 TRPA Car Free Day

Safe Routes to School



Bike to School Week promotes active transportation at schools by coordinating group rides, providing route information, and offering recognition for participants. During the first week of June 2015, the Community Mobility Group led a pilot program for Bike to School week. All elementary schools within the City of South Lake Tahoe and the town of Meyers participated. Coordinated rides included a series of drop off points where parents could take students if they were too young to bike alone, didn't have a bike, or lived too far away. Volunteers were stationed at each school to pass out and hole-punch cards for each day students used active transportation. At the end of the week, participating students were recognized with prizes.

Regional Advocacy Efforts

Bike Maps:
User maps and mobile applications are another method of encouraging people to use active transportation. A variety of Lake Tahoe organizations, including the TCPUD and LTBC, produce free hard-copy maps for the community. LTBC annually distributes 10,000 hard-copy paper maps to bike shops, retail stores, and major recreation destinations around the Lake Tahoe and Truckee Regions. LTBC also maintains an interactive online bike map that includes information about construction projects and winter plowing operations. These efforts are supported through funds from TRPA and other local jurisdictions.

Bike Valet:
A bike valet – like a coat check for your bike! - is a free service that provides safe and convenient valet bicycle parking for Tahoe's community events. Event vendors and hosts can attract more people to their event and reduce their environmental impact by providing a bike valet for attendees. Organizations like the Lake Tahoe Bicycle Coalition and Town of Truckee provide their bike valet gear and services at local events and more organizations are beginning to provide these services. Permanent bike valet locations may be established in town centers or at major event destinations such as the new Tahoe South Event Center, or in the Casino Core in South Lake Tahoe.

Bike Safety Education:
Several agencies around the region support bicycle safety education and advocacy efforts. The Lake Tahoe Bicycle Coalition's "Bike Safe Lake Tahoe" campaign includes education and awareness messaging for drivers and cyclists sharing the road. The Tahoe Fund also supports LTBCs campaign through funding for subsidized bike lights that LTBC both gives out and sells at a reduced cost.

Bike Kitchen & Donation Program:
The Lake Tahoe Bicycle Coalition started the Bike Kitchen & Donation program in 2021 by collecting bikes from donors, performing needed repairs and maintenance to the bikes, and then donating them to community members by working directly with local social services organizations to identify individuals. Since its inception, LTBC has fixed up and donated 72 bicycles to individuals in need throughout the Lake Tahoe and Truckee region.

As part of this program, LTBC also organizes bike kitchen pop-up events to fix donated bikes and to teach the community how to fix up their own bicycles. At the pop-up events, paid bicycle mechanics assist LTBC volunteers in repairing donated bicycles and teach community members how to perform basic maintenance and repairs to their own bikes. These events provide a space for the community to gain the skills necessary to maintain their bicycles throughout the riding season while increasing the inventory of bicycles available for community members who have limited access to other forms of transportation.

Transportation Demand Management

Transportation Demand Management (TDM) is a combination of strategies that incentivize use of non-auto modes of transportation. TDM makes it easier for travelers to shift some trips from driving alone to multi-modal methods.[1] Offering a connected, safe, and convenient active transport network and support facilities are all methods of TDM. The TRPA *2015 Tahoe Basin ITS Strategic Plan* recommends adding bicycle detection, flashing-beacon crosswalks, and other pedestrian-signal upgrades that directly impact accessibility as TDM strategies.

***2020 Linking Tahoe: Regional Transportation Plan/Sustainable Communities Strategy* outlines the Employer Trip Reduction Ordinance, which includes many of the below TDM strategies.**

- Flexible work schedules
- Telecommuting
- Bicycle fleets for commuting to meetings within a specified distance
- Financial incentives such as subsidized transit passes or pre-tax deductions for bicycle commute costs.
- Support facilities such as secure bike parking, showers, and dressing rooms with lockers.

Boulder BCycle.
Photo: Erica Van Steenis

Cities, counties, and private entrepreneurs can also offer more bike carrying capacity on buses, or bikeshare programs that assist users in their first and last mile when conducting travel in combination with public transit. The 2015 Survey asked respondents if their most common transit stops provide secure bicycle parking. Not offering adequate bike parking discourages people from leaving their bike at bus stops or using multi-modal methods. This issue is compounded by many buses not having enough bike carrying capacity available for users, as currently Lake Tahoe buses only have capacity for two bikes at a time. Survey respondents indicated that bike rack space is not available 11 percent of the time.

Increasing capacity on buses is one solution, while another is a bikeshare program. Bike share or scooter share programs can be offered by governments or private entities, such as scooter share in the City of South Lake Tahoe or the BCycle electric bicycle sharing offered by the Town of Truckee.

[1] SANDAG, 2012

5.2 EDUCATION & AWARENESS:

Education and awareness programming should engage people of all ages and include local community members and visitors to the region. One overarching approach that increases education and awareness is the "Vision Zero" initiative. Vision Zero contends that *no loss of life is acceptable* and asks partners to focus resources on solutions that stop roadway conflict fatalities from occurring. Vision Zero began in Sweden in the mid-1990s and has quickly spread to many countries, as well as to states and cities throughout the United States. Nevada reflects the Vision Zero initiative through its "Zero Fatalities" program (http://www.zerofatalitiesnv.com/) with a goal of zero fatalities by 2050. California prioritizes Vision Zero in the Vulnerable Road User Safety Assessment, which outlines a vision of zero fatalities and serious injuries by 2050. TRPA has developed the 2024 Vision Zero Strategy to identify strategies that will increase community awareness towards sharing the road safely with all users and eliminating roadway fatalities.

Safe Routes to School

Some existing programs have been conducted in an ad hoc manner over the last 10 years, such as bicycle rodeos. There are also several supporting programs sponsored by organizations serving the local student-age population, including the Boys and Girls Club and the Recreation Center summer camp program. In addition, during 2015 agencies and advocacy groups organized several pilot projects. These included Bike to School Week and Safe Routes to Schools activities at community events.

Bijou Bike Club Rider

This plan recommends a comprehensive and consistent Safe Routes to Schools Education & Encouragement Program that can be planned and implemented by a designated local SRTS coordinators and a partnership of agencies and volunteers. The Lake Tahoe Unified School District has adopted the programs listed below in their SRTS Master Plan, and it is recommended that other districts without a master plan pursue implementation of similar programs. Activities may be implemented in phases or as pilot projects.

Regional SRTS Coordinator:

Many counties, school districts, and regions throughout the country have SRTS coordinators that work with stakeholders to improve infrastructure, organize and teach education programs, and work with volunteers on encouragement campaigns and activities.

Safe Routes to School Volunteers on Bike to School Day

Educational Programs:
This plan recommends that all students in grades K-8 in all district schools participate in at least two to three education and encouragement activities each year.

Bicycle Rodeo, Grades K-5

A bicycle rodeo consists of multiple stations that students rotate through over the course of a physical education class. The stations educate students about bike skills and safety and include discussion of the environmental benefits of active transportation and physical activity. All stations are interactive. Station themes can range from checking to ensure helmets fit properly to properly signaling turns and weaving through an obstacle course of cones. Instruction and teaching materials become more advanced for older grades so students are able to refine their skills and learn new ones each year.

In-Class Education Series, Grades 2, 4, and 6

The Safe Routes to School program includes in-class curriculum geared towards grades 2, 4, and 6. The in-class education series teaches students about bicycle safety and the environmental benefits of active transportation. The curriculum outlines 75-minute sessions for each classroom of second, fourth, and sixth graders. In second grade, the focus is on safe walking and street safety, such as street crossing. In fourth and sixth grade, the focus is on bike safety and the traffic regulations that govern active transport. TRPA has partnered with the school districts since 2015 to teach this curriculum to fourth grade students. Moving forward, TRPA hopes to empower the teachers, parents and volunteers from local organizations to teach the series, and expand to other grades.

Slow Bike Race

Activity	Grade	Season	Partners
Bicycle Rodeos	K-6	Fall and/or Spring	Physical Education Teachers, CSLT PD, CHP, TRPA
In-Classroom Education Series	K -8	Winter	Science teachers, TRPA/TMPO, Parent Volunteers
Bike and Walk to School Days	K – 8	Tahoe Bike Month	Parent Volunteers, TRPA, Advocacy Groups
Walking School Bus & Bicycle Trains	All Grades	Monthly	Parent Volunteers

Table 5-2: Safe Routes to School Education & Encouragement Program Outline. Source: LTUSD SRTS Master Plan.

5.3 EVALUATION

Workshop Activity. Photo: Jen Cannon

Consistent evaluation of network facilities and programmatic efforts help to determine what is working and where investments and improvements are necessary. Data also helps implementers demonstrate project need for funding opportunities by showing current and estimated use patterns, crash data, and community desire. TRPA role is to act as a clearinghouse and provide analysis of collected information. Partnering entities are encouraged to monitor their programs and projects and coordinate with TRPA on data collection and analysis. Historically, monitoring of projects and programs is conducted on an infrequent or ad hoc basis. To better assist in this collaborative effort, TRPA produced the *Lake Tahoe Bicycle & Pedestrian Monitoring Protocol* found in Appendix C*,* will annually report on Active Transportation Plan progress through its annual report, and continue to conduct community surveys as appropriate.

Bike Trail User Model

The Bike Trail User Model estimates bicycle and pedestrian trips on Class I/shared-use paths and Class II/bicycle lanes in the region. This model is based upon observed facility use levels, characteristics of user types, and demographic and travel data. The model estimates reflect relatively urban or inter-community travel corridors, and are not applicable to mountain bike trails. The model is used to help estimate the impacts of bicycling and walking region-wide for the Regional Plan and Regional Transportation Plan, and is also used to estimate active transportation on individual trail segments. Jurisdictions, departments of transportation, and funders will find the model useful for estimating potential trail use for planned projects. Over the next four years, TRPA/TMPO will use bike trail user counts collected through the *Lake Tahoe Bicycle & Pedestrian Monitoring Protocol* to validate and update the model if necessary.

Lake Tahoe Region Bicycle & Pedestrian Monitoring Protocol

As described in Chapter 2, TRPA developed the *Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol* to establish a clear and consistent approach to collecting bicycle and pedestrian volume data in the Region. By implementing the protocol, TRPA is building on prior bicycle and pedestrian monitoring programs conducted by a variety of partners. This creates a coordinated and consistent, ongoing monitoring program that tracks changes in bicycle and pedestrian volumes. The data collected each year as part of this program will be used for a variety of purposes, including project prioritization, safety analysis, utilization trends, and support for grant applications. TRPA began implementing the protocol in 2015. More information can be found in Appendix D.

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CHAPTER 6: IMPLEMENTATION PLAN

Implementation is by far the most challenging aspect of creating a successful active transportation network. Significant obstacles can include acquisition of right-of-way, securing construction and maintenance funding, designing projects that provide access for all roadway users, and meeting environmental standards. Partners must work together to find common ground on project designs, locations, and funding mechanisms. This chapter outlines the actions that partnering agencies should take to implement the goals and policies in Chapter 3. To assist in project development, Section 6.2 contains cost estimates that can be used as a resource when estimating full project cost. This can be helpful for grant applications, or when budgeting various funding sources (such as TRPA Mobility Mitigation Fees) for project implementation. In section 6.3, the project list is explained, and can be found in Appendix E. Finally, this chapter also includes funding strategies.

Kahle and Laura Drive Intersection. Photo: Mike Vollmer.

6.1 ACTIONS

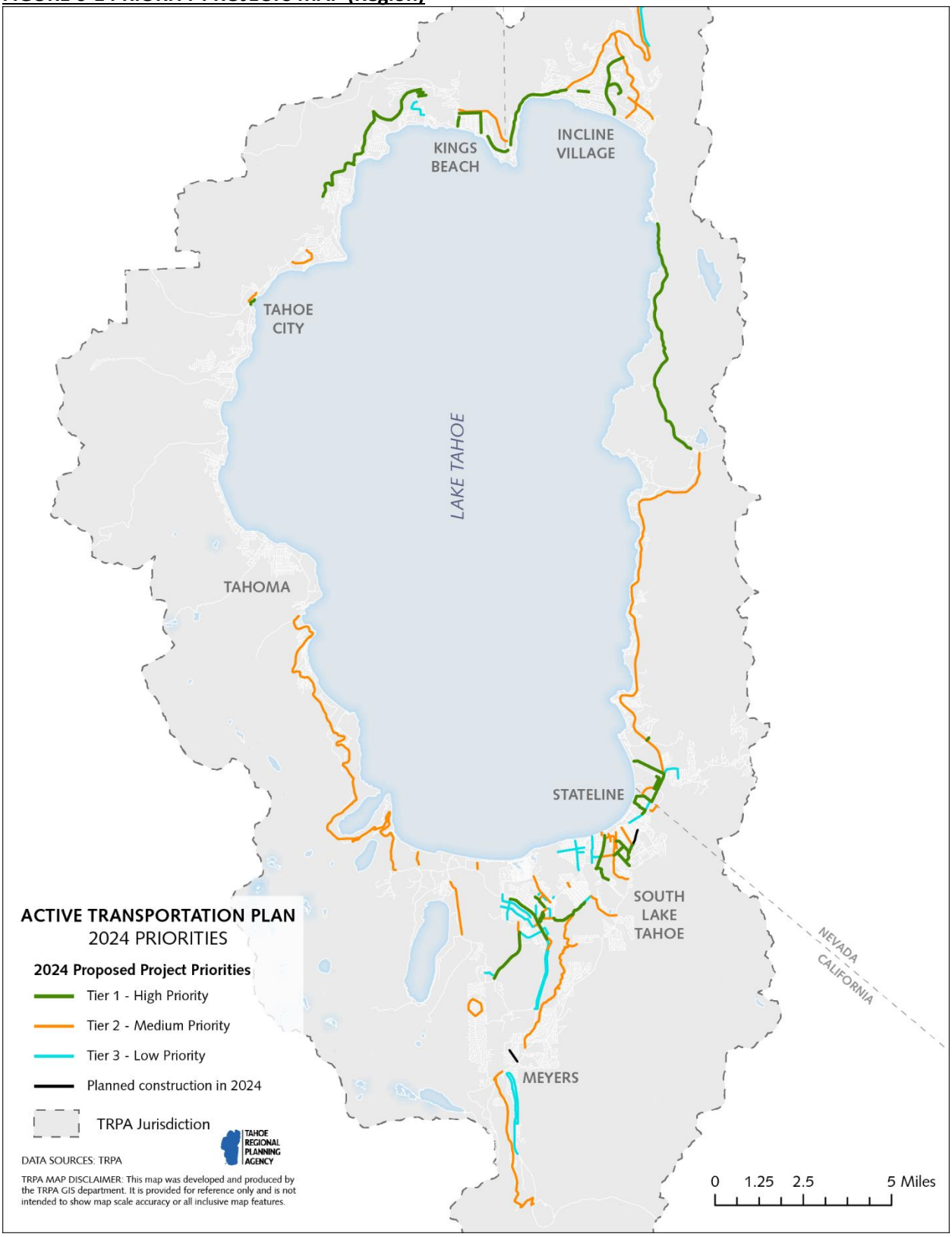
To initiate the implementation of the Active Transportation Plan, TRPA is focused on identified tier 1 priority projects, which are primarily updates to active transportation infrastructure within Tahoe's town centers. These improvements to areas that have a high probability of capturing mode shift (from automobile to walking, biking, or rolling) due to the short-distance nature of these trips. Creating a safe, low-stress connection from the neighborhoods to the commercial areas of town centers, recreation destinations, and transit hubs will help TRPA and the region reduce its VMT, allowing for a safer, more vibrant Tahoe environment and economy. The tier 1 priority projects include an emphasis on funding, offering technical assistance on preliminary engineering, design, and policy development, improving active transportation data collection, and enhancing regional efforts to improve the delivery of active transportation projects.

Tiered Priority Projects

To efficiently implement the plan, and to ensure we are moving toward our sustainability and safety goals, TRPA, alongside a collaborative effort with our local implementing partners, developed three priority tiers to help guide and focus on maximizing our efforts, in terms of funding and constructing active transportation projects. The methodology behind these priority tiers was simple. First, TRPA collaborated with the local agencies on what projects were identified as priority capital improvement projects, gaps in their network, remaining priority projects carried over from the last active transportation plan, or the most recent Regional Transportation Plan. As the regional MPO, TRPA also considered whether the project is regionally significant to help determine what was selected as a tier 1, 2, or 3 project. Competitiveness for funding was also considered as a factor.

Beyond coordination with local jurisdictions, identifying regional significance, and seeking to achieve stated mode shift and VMT reduction goals, TRPA recently conducted a Vision Zero high injury network analysis to develop its own priority project list. Utilizing the Bicycle Level of Traffic Stress analysis, collision data, and TRPA identified "Community Priority Zones" (an equity metric), the Vision Zero strategy identified several projects within the active transportation plan that rose to the level of being a tier 1 priority. This was a data-driven approach designed to emphasize reduction of the stress levels of the transportation network, to reduce severe injury and fatalities for all roadway users, and to support increased utilization of active transportation modes. Through these various goal-achieving, collaborative, and data-focused approaches, we arrived at our tiered priority projects list.

FIGURE 6-1 PRIORITY PROJECTS MAP (Region)


KINGS BEACH
INCLINE VILLAGE
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
NEVADA
CALIFORNIA
MEYERS
ACTIVE TRANSPORTATION PLAN
2024 PRIORITIES
2024 Proposed Project Priorities
Tier 1 - High Priority
Tier 2 - Medium Priority
Tier 3 - Low Priority
Planned construction in 2024
TRPA Jurisdiction
TAHOE REGIONAL PLANNING AGENCY
DATA SOURCES: TRPA
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 1.25 2.5 5 Miles

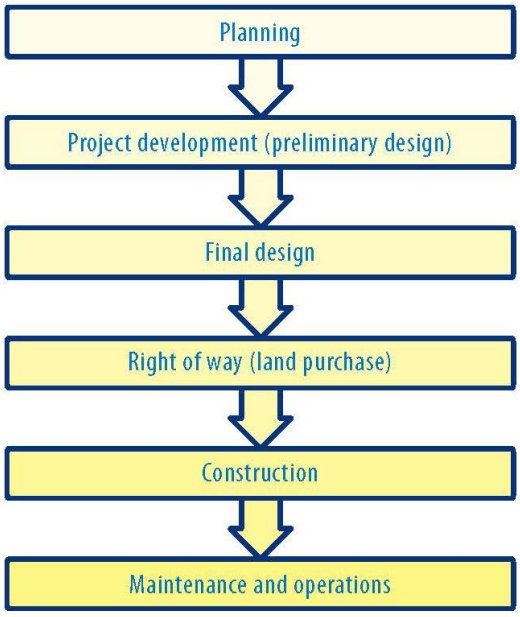
6.2 BALANCING COST AND BENEFITS

Implementation of the active transportation network incurs short and long terms costs, while also affording benefits to transportation users, the environment, and the community. To determine the potential effectiveness of a project in comparison to the cost, increasingly governmental agencies are conducting cost benefit analyses. This type of analysis compares potential benefits such as reduction in VMT, increased physical activity (health), and decreased crash incidence to total project cost. A variety of tools are available, such as the *California Active Transportation Program Benefit/Cost Tool*, which can be accessed on the Caltrans website. Cost/benefit tools are used for detailed analysis that quantifies data collected for specific projects. For high-level project prioritization, as is conducted for this plan, assessment of cost and benefits are conducted through the use of broad quantitative and qualitative criteria.

Sawmill Bike Path. Photo: Mike Vollmer

6.3 COST ESTIMATES AND PROJECT PHASES

Project Phase: Implementation of the active transportation network involves many planning phases and sources of funding. Often, active transport facilities are included as parts of other projects, such as water quality improvements on the state highway system. When considering the full cost of projects, implementers must factor in all phases of work, including planning, design, environmental review, construction, and on-going maintenance. It is difficult to assess the cost of each phase, as it is highly dependent on project type, size and the amount of community outreach and environmental review. This is based on a variety of factors such as ease of implementation, right-of-way constraints, level of community support, and geography. An extremely important cost, estimates of which are not included in this plan, are maintenance costs. The active transportation network is only as effective as its reliable maintenance, and TRPA along with local jurisdictions are committed to identifying sustainable funding for long-term maintenance of the active transportation facilities.



Project Type: High-level, average costs are used to generate an overall estimated cost by project type, such as implementation of a Class I/shared-use path, or a sidewalk. These are rough costs based on historical local cost data, current project data, national research, level of improvement, and geographic considerations. For this plan, the cost estimates represent projected costs from planning through construction phases. Below is a list of potential elements that could be included into any project and are not necessarily exclusive to one project type (e.g. a complete streets project may incorporate a Class I shared use trail, or a Class IV facility and a sidewalk.) For Class IV protected bikeway facilities, a subset of complete streets costs was used, however smaller elements like flexible delineators and vertical curb construction were not included with needs so preliminary.

Facility Type	Estimated Cost	Cost Unit
Class I Shared Use Path		
Minimal challenges to implement	$10,000,000.00	per mile
Substantial challenges to implement	$17,000,000.00	per mile
Class II (IIb) Bike lanes		
Striping w/ bicycle legend (residential)	$80,000.00	per mile
Striping, bicycle legends, and minor green paint (collectors)	$150,000.00	per mile
Striping, bicycle legends, with comprehensive green paint, intersection treatments (arterial)	$250,000.00	per mile
Class III Bicycle Boulevard		
Signage	$400.00	each
Striping/Sharrows	$1,000.00	each
Pedestrian		
Sidewalk (5ft)	$80,000.00	per mile
Rapid Rectangular Flashing Beacon	$20,000.00	each
Pedestrian Hybrid Beacon	$500,000.00	each
Crosswalk(s)	$13,000.00	each
Pedestrian Refuge Island	$30,000.00	each
Complete Streets		
Curb and gutter	$530,000.00	per mile
Storm drain	$15,000.00	each
Landscaping	$100,000.00	mile
Lighting	$15,000.00	each

Table 6-1: Project Type High Level Cost Estimate. Source: TRPA

6.4 FUNDING STRATEGIES

Construction of the active transportation network at Lake Tahoe is a partnership between federal, state, and local agencies. Partners work together to combine funding sources and construction and maintenance responsibilities. EIP Project expenditures are tracked by all agencies in the Region and are consolidated in the transportation tracker, located online at https://transportation.laketahoeinfo.org/. This helpful tool can segregate projects by infrastructure type, jurisdiction, funding source, estimated need and more.

Funding Sources

The funding needs for the Tahoe region's active transportation plans are not insignificant. Mountain geography construction mobilization, increased construction costs, as well as topographic and geologic challenges such as steep mountain sides and various soil types, all contribute to increased overall project costs. The total cost of Tahoe's entire active transportation project list stands at approximately $1.1 billion, for proposed projects through 2050. However, substantial portions of this cost relate to a small percentage of projects. High-profile Class I trails through steep mountainous sections that require complex geotechnical work are a large portion of this cost total. When parsed out for tier 1 priority projects only, the cost is a more manageable $294 million. These estimated totals represent the planning through construction phase costs.

Many projects will use federal and state funding sources made available through TRPA's Regional Grant Program (RGP), such as the Surface Transportation Block Grant Program (STBG).

LIST OF FEDERAL, STATE, AND LOCAL GRANT PROGRAMS:

**Note: The below list is non-exhaustive, but is a starting point when researching possible grant opportunities.*

The federal government offers a wide variety of funding sources. The FHWA offers a very helpful website that lists all funding opportunities and eligible project components on their website: Pedestrian and Bicycle Funding Opportunities (dot.gov)

Specific program requirements must be met and eligibility must be determined on a case-by-case basis. For example: Transit funds must provide access to transit; Congestion Mitigation and Air Quality Improvement Program (CMAQ) must benefit air quality; Highway Safety Improvement Program (HSIP) projects must be consistent with the State Strategic Highway Safety Plan and address a highway safety problem; NHPP must benefit National Highway System (NHS) corridors; the Federal Lands and Tribal Transportation Programs (FLTTP) must provide access to or within federal or tribal lands. Some (not all) of these funds below are channeled through the TRPA and distributed through our Regional Grant Program, which directly supports implementation of the plan.

Highway Safety Improvement Program (HSIP)

HSIP are federal funds that are administered by State departments of transportation. The purpose of the Highway Safety Improvement Program (HSIP) is to significantly reduce traffic fatalities and serious injuries on public roads, including non-state-owned public roads and roads on tribal land. HSIP funds are eligible for work on any public road or publicly owned bicycle or pedestrian pathway or trail, or on tribal lands for general use of tribal members, that improves safety for its users.

Congestion Mitigation and Air Quality Programs (CMAQ)

CMAQ was devised to provide a flexible funding source to State and local governments for transportation projects and programs to help meet requirements of the Clean Air Act. CMAQ funding is available to reduce congestion and improve air quality.

Surface Transportation Block Grant (STBG)

STBG promotes flexibility in State and local transportation decisions and provides flexible funding to best address State and local transportation needs.

Carbon Reduction Program (CRP)

CRP provides funds for projects designed to reduce transportation emissions, defined as carbon dioxide (CO2) emissions from on-road highway sources.

Nevada Transportation Alternatives Program (TAP)

TAP provides federal funds for a variety of smaller-scale, non-traditional, community-based transportation projects that improve safety, expand travel choices, and enhance the transportation experience. These projects are intended to integrate modes and improve the cultural, historic, and environmental aspects of our transportation infrastructure.

California Active Transportation Program (ATP)

The Active Transportation Program was created by Senate Bill 99 to encourage increased use of active modes of transportation, such as walking and biking.

Other potential funding opportunities:

There are also a host of discretionary, local, and state funding opportunities such as:

- City and County Funds
- TRPA Mitigation Funds
- Developer Fees
- Private Contributions
- Transient Occupancy Tax (TOT)
- Tourism Business Improvement District (TBID/BID)
- Safe Streets and Roads for All (SS4A)
- PROTECT (federal)
- Local Transportation Climate Adaptation Program (LTCAP)
- Other Taxes

Wildwood. Photo: Mike Vollmer.

Pilot Projects and Quick builds

If immediate funding for full construction is not available, a potential solution for local implementers are options such as “pilot projects” and or “quick builds”. These options are essential for piloting safety improvement projects using lower cost materials designed to be implemented quickly in order to determine the real-world efficacy of any roadway change. Utilizing before and after data collection, pilot projects are monitored to understand benefits and tradeoffs, with the goal of adjusting the final design once full funding becomes available.

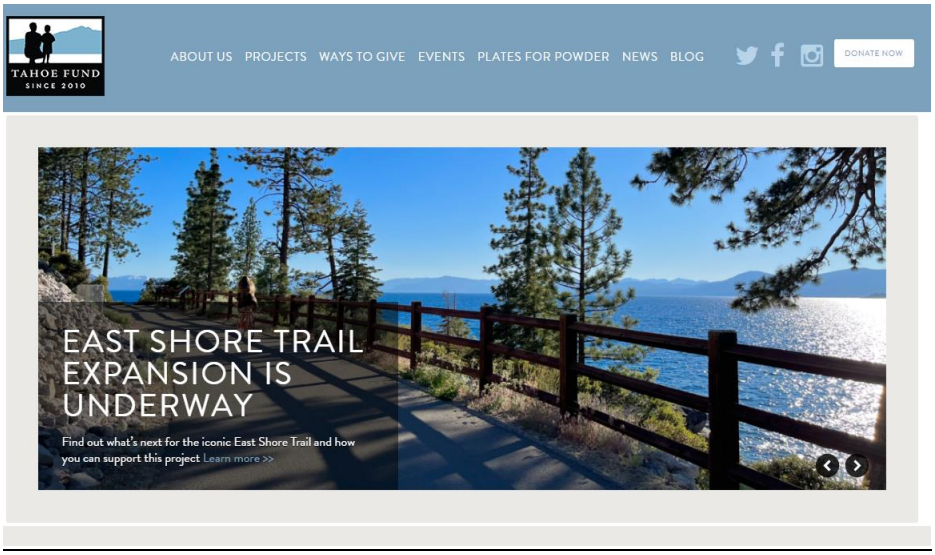
Technical Assistance:

TRPA and its knowledgeable staff are available to help provide planning and technical support to city, county, and state agencies. Assisting in preparing active transportation discretionary grant applications and reviewing projects to ensure consistency with the RTP can expedite implementation. This collaboration supports our regional partnerships, encouraging partners to utilize staff knowledge in taking projects from plans and concepts to detailed designs that can more easily compete for funding.

TAHOE-SPECIFIC:

Tahoe Fund

The Tahoe Fund inspires the private community to support environmental improvement projects that improve watersheds and lake clarity, enhance outdoor recreation, and build a greater sense of stewardship in the Tahoe Basin. The Tahoe Fund has supported the implementation of many projects region-wide, including a Bicycle Parking Program managed by the Lake Tahoe Bicycle Coalition.



League To Save Lake Tahoe (Keep Tahoe Blue)

Another organization with high-priority regional goals in mind is the League to Save Lake Tahoe. Partnerships with this organization have yielded great results in supporting active transportation initiatives, most noteably the League's support of shared mobility transportation in bringing first-mile-last-mile solutions to residents and visitors of Lake Tahoe. Shared mobility has seen excellent ridership in the City of South Lake Tahoe, and programs like this would not be feasible without the support of organizations such as the League to Save Lake Tahoe.

KEEP TAHOE BLUE®
League to Save Lake Tahoe

Image Sources: www.keeptahoeblue.org

THANK YOU!

Thank you to all project partners, community members, and elected officials, for your continued support promoting and building active transportation infrastructure at Lake Tahoe. This plan illustrates our progress in the Lake Tahoe Region and provides a vision for our continued success. Together, we can continue to support innovative complete street projects that improve the mobility and safety of all roadway users. And for those about to actively transport: We salute you!

Logan Shoals. Photo: Tom Lotshaw

Appendix A

Lake Tahoe Complete Streets Resource Guide

Support and End of Trip Facilities updated for 2024 Plan Update

Lake Tahoe Complete Street Resource Guide

Prepared for Tahoe Regional Planning Agency/ Tahoe Metropolitan Planning Organization

January 2016 **

Prepared by:
Alta Planning + Design

131 L Street
Sacramento, CA
95814

**includes April 2024 update to Support and End of Trip Facilities, prepared by TRPA

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TABLE OF CONTENTS

Foreword: Complete Streets Workshop - Recap, Next Steps & Actions 1

Introduction 9

Policy Guidance 10
Bikeway Classification Overview 13

Shared-Use Paths 15

Pathway Design 16
Side Paths At Driveways And Minor Streets 18
Tread-Separated Shared-Use Path 20
Boardwalks 21
Causeways 22
Aggregate Surface Trails 23
Lighting 24
Bollards 25
Bollard Alternatives 26
Recommended Yield Policies 27
Summary Of Coverage Requirements 28

Shared-Use Path Crossings 29

Path Crossing At Intersection 30
Stop Versus Yield Markings At Crossings 31
Marked/Unsignalized Mid-Block Crossings 32
Active Warning Beacons 33
Hybrid Beacons 34
Signalized Mid-Block Crossing 35
Intersections With Small Streets 36

On-Street Bicycle Facility Design 39

Bicycle Boulevard 40
Shoulder Bike Route 41
Shared Lane Markings (Sharrows) 42
Bike Lane With No On-Street Parking 43
Bike Lane With On-Street Parallel Parking 44
Buffered Bike Lane 45
Separated Bikeway (Cycle Track) 46
Advisory Bike Lane 47
Additional Bike Route Signage 48
Manholes And Drainage Gates 49
Bicycle Access During Construction Activities 50

TABLE OF CONTENTS (CONT.)

Bicycle Intersection Design 51
- Bicycle Detection At Signalized Intersections 52
- Loop Detector Pavement Markings And Signage 53
- Bicycle Push Buttons 54
- Bicycle Signal Phase 55
- Bike Box 56
- Two-Stage Left Turn Box 57
- Bike Lane At Intersection With Right Turn Only Lane 58
- Combined Bike Lane/Turn Lane 59
- Bike Lane At Drop Lane 60
- Separated Bike Lane Intersection Approaches 61
- Single Lane Roundabouts 62
- Protected Intersections 63

Pedestrian Facility Design 65
- Sidewalk Widths 66
- Sidewalk Material 67
- Furnishings 69
- Curb Ramps 70

Pedestrian Intersection Design 71
- Pedestrian Crosswalk Design 72
- Pedestrian Refuge Islands 73
- In-Street Crosswalk Signage 74
- Curb Extensions (Bulb Outs) 75

Design Of Interpretive And Wayfinding Signage 77
- Interpretive Signage 78
- Wayfinding Signage - Local Guidelines 79
- Wayfinding Signage - Types 80
- Wayfinding Signage - Placement 81

Support And End Of Trip Facilities 83
- Recommended Rates Of Bicycle Parking 84
- Bicycle Parking 86
- Bicycle Rack Design 88
- Bicycle Locker Design 89
- Showers And Lockers 90

Maintenance Standards 91
- Shared-Use Path Maintenance Standards 92
- On-Street Facility Maintenance Standards 94
- Separated Bike Lane Maintenance 95

FOREWORD:

COMPLETE STREETS WORKSHOP

RECAP, NEXT STEPS & ACTIONS

OVERVIEW

TRPA/TMPO hosted a Complete Streets Workshop on Wednesday, November 18 and Thursday, November 19, 2015 for local, regional and state agency partners. Alta Planning + Design's Joe Gilpin, National Association of City Transportation Officials Certified, and Bryan Jones, PE, AICP, facilitated the workshop. Many agencies in the area, such as Truckee, Kings Beach, Tahoe City, and Carson City, are already applying complete street techniques to their projects to improve mobility and safety for all users. Key examples are the King's Beach roundabouts and Truckee's many projects including roundabouts, paid parking, trail system, and creative funding mechanisms and partnerships for maintenance. In addition, Caltrans and FHWA highlighted their efforts to encourage engineering judgment, design flexibility, and complete street funding opportunities.

More than 60 people attended the workshop, representing the following agencies:

- California Department of Transportation
- Nevada Department of Transportation
- Washoe County
- El Dorado County
- Douglas County
- Placer County
- Town of Truckee
- City of South Lake Tahoe
- California Highway Patrol
- Tahoe City Public Utility District
- California Tahoe Conservancy
- Federal Highway Administration
- TRPA/TMPO

Through brainstorm sessions, presentations, and expert panel discussions, Day 1 focused on exploring a variety of topics including:

- What makes the Tahoe Region unique and special to its residents and visitors
- Identifying Tahoe's transportation system customers and the challenges the Region faces serving them
- Redefining the challenges agency staff must solve
- Broadening the use of tools, resources, and solutions
- Debunking policy, funding, and engineering misconceptions to empower and enable complete street implementation
- Identifying agency-specific policies and commitments to designing and building complete street infrastructure
- Networking with regional partners to create new relationships, synergy and partnerships to better serve the Region.

Day 1 also included three guest presenters:

1. A keynote presentation by Dan Wilkins, the Public Works Director for the Town of Truckee. Dan highlighted Truckee's successes with trails, paid parking, roundabouts, and funding opportunities.
2. A roundabout and design flexibility presentation by Hilary Isebrands, a Federal Highway Administration (FHWA) Safety Engineer specializing in roundabouts and road safety audits.
3. A presentation on intersection control evaluation by Jerry Champa, Traffic Safety Liaison, for Caltrans.

The expert panel discussions involved agencies from all levels of government and included the audience in a question and answer period. The panel provided a localized discussion on challenges, opportunities, and commitments. Panel participants are listed on the right.

Day 2 began with a robust discussion about the key takeaways from day 1, followed by group design exercises of five local Tahoe roadway challenges. Participants split into three groups, with a mix of agency staff and expertise. These exercises gave participants an opportunity to apply newly learned tools in an intense and collaborative design process. Armed with data and local knowledge, groups proposed options for improving mobility, and safety for all users.

Expert Panel Participants

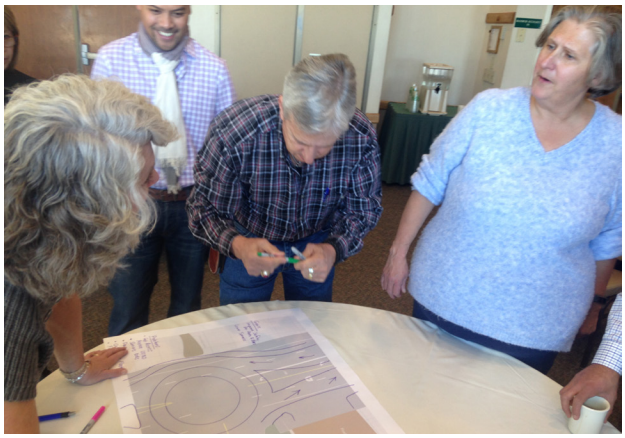
Planning, Design & Funding

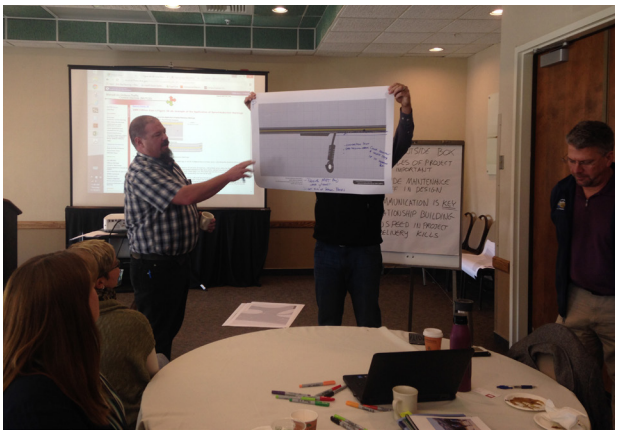
Name	Organization	Position
Sondra Rosenberg	NDOT	Assistant Director Planning
Robert Peterson	Caltrans HQ	Chief, Office of HSIP
Chris Engleman	Caltrans HQ	CA MUTCD / CTCDC
David Cohen	FHWA California Division	Traffic Safety Specialist
Jerry Champa	Caltrans HQ	Traffic Safety & Ops Liaison Engineer
Dan Wilkins	Town of Truckee	Public Works Director

Implementation & Maintenance

Name	Organization	Position
Hilary Isebrands	FHWA Resource Center	Safety Engineer
Dan Wilkins	Town of Truckee	Public Works Director
Brian Stewart	Placer County Public Works	Design & Construction Engineer
Rod Murphy	Caltrans	District 3 Project Manager
Thor Dyson	NDOT	District 2 Engineer
Jerry Champa	Caltrans HQ	Traffic Safety & Ops Liaison Engineer
Tom Hallenbeck	Caltrans HQ	Traffic Safety Division Chief

Brainstorming Session on Day 1





Participants Create and Share Their Design Solutions on Day 2

Top Concerns

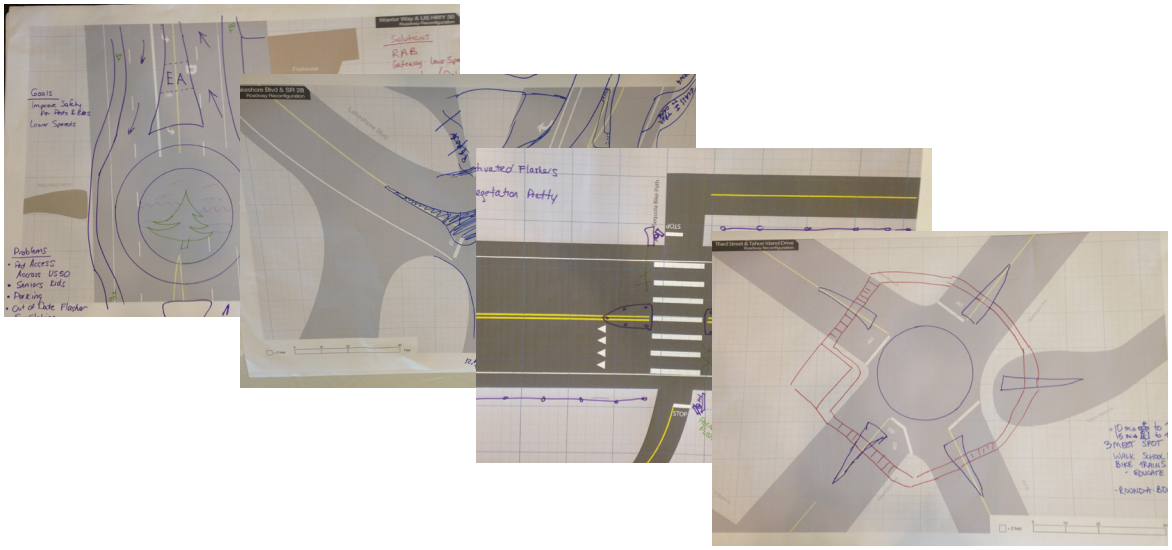
Alta Planning + Design led a brainstorm discussion at the beginning of the day to help identify local concerns about implementing complete streets projects. The main concerns included:

- The difficulty of designing projects for peak season and off peak season demands and needs. How can you design for both?
- Generating public support for project design, maintenance and funding.
- The conservation of natural resources.
- Support for design flexibility among agency leaders.
- The challenge of designing projects for snow removal and storage.

Who Are Tahoe's Customers?

The next brainstorm identified customers the Region serves or needs to serve with our transportation system. The list was long and diverse.

- Local residents and businesses
- Tourists (local, national, and international)
- People that walk, bike, drive, and use transit
- Emergency responders
- Special events
- Maintenance crews
- Regular and seasonal workforce
- People of different socio-economic backgrounds
- Freight and goods movement
- People seeking parking and access to destinations such as casinos, ski resorts, trail heads, and beaches.



Example Designs

The Biggest Barrier

Project Design & Liability

Presentations, panel sessions, design exercises, and peer to peer conversations all touched on this issue. Resources regarding design flexibility include:

- FHWA supports design flexibility through its 2013 memo, "Bicycle and Pedestrian Facility Design Flexibility." In that memo, FHWA refers planners and engineers to guides published by the American Association of State Highway and Transportation Officials, the National Association of City Transportation Officials, and the Institute of Transportation Engineers. FHWA also published the "Revision of Thirteen Controlling Criteria for Design" in 2015 which promotes design flexibility and clarifies FHWA's standards.
- Deputy Directive 64-R2, signed in October 2008 and renewed in 2014, directs Caltrans to implement complete streets.

  "The Department provides for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities and products on the State Highway System."

- The 2014 Caltrans memo, "Design Flexibility in Multi-Modal Design," provides for flexibility in design through experimental project processes. The memo identifies design documents such as the National Association of City Transportation Officials' "Urban Street Design Guide," "Urban Bikeway Design Guide," and the Institute of Transportation Engineers' "Designing Urban Walkable Thoroughfares" as important resources when considering designs that accommodate all users.

Local Issues and Solutions

Local issues and solutions were identified to support staff in taking advantage of the design flexibility offered by these federal and state government agencies.

Supported Documented Innovative Design

Many staff and elected officials are deterred from opportunistic innovation by perceived limitations. Staff and elected officials can rely too heavily on common standards, existing knowledge, or historic project experience. It is easy to be overly reactive to initial public perception, rather than letting a project gain support over time as the public becomes more familiar. There is a perceived high risk in trying something new, combined with a fear of costly failure both financially to the agency and in personal employment.

Generate Strong Leadership & Local Champions

Support and encourage agency staff to pursue new designs that better accommodate all users. Strong leadership can exist at the staff and elected official level. Leaders create a clear vision, and encourage staff to utilize new tools, resources, and techniques by creating an environment that supports experimentation and innovation to improve projects. Leaders should also increase the reward for successful project implementation that is adaptive, flexible and improves over time. Champions are those who are the first to implement new tools, resources, and techniques.

Activate Public Support for Projects & Funding Initiatives

Public support encourages continued innovative project implementation. Many projects that prioritize all roadway users require a change in roadway design, maintenance operations, and user behavior. Leaders can identify opportunities to bring additional support to agency staff through frequent training and by offering public education opportunities to the Region. Education should focus on increasing awareness about what other recreational tourism destinations and mountain communities do to publicly and financially support complete street implementation and maintenance. Interim projects, a phased project approach, and including maintenance staff during project design are other ways to gain public support and reduce increased maintenance costs.

Key Takeaways

Complete Street Policies & Vision Already Exist at Lake Tahoe

The Tahoe Region has a clear complete streets vision. TRPA/TMPO's Regional Plan and local agency general and area plans contain policy language that clearly defines a complete street policy and supports complete streets by

Panel Discussion

planning for creating walkable, bikeable communities. The following are some of the current policies that support complete streets in the Region.

TRPA/TMPO Active Transportation Plan:

Policy 1.1: Transportation projects will accommodate the needs of all travelers by designing and operating roads to provide for safe, comfortable, and efficient travel for roadways users of all ages and abilities such as pedestrians, bicyclists, transit riders, motorists, commercial vehicles, and emergency vehicles.

City of South Lake Tahoe General Plan:

Policy TC-1.8: Complete Streets Design: The City shall seek to develop or upgrade all State Highways, arterials, and collectors as Complete Streets that accommodate all travel modes.

Douglas County General Plan:

Policy 7-2A.3 Through the design process, ensure that collector and arterial road rights-of-way are wide enough to accommodate all identified street users and functions. These may include vehicles, transit, pedestrians, bike lanes, off-street shared use trails, landscaping and roundabouts. Traffic calming features should be included to improve safety and increase pedestrian and bicyclist safety.

Policy 7-2C.2 Design neighborhood streets to calm traffic and discourage traffic volumes in excess of adopted standards using methods such as shorter street lengths.

Policy 7-4B.4 Ensure new and existing developments promote connectivity through road and off-street path design to reduce trip lengths, provide multiple alternative travel routes between community uses and destinations, and provide alternatives to automobile use.

El Dorado County – Meyer's Area Plan

Page 3-3: Transportation and Circulation Goal: Redevelop the transportation system within the community plan area to reduce reliance on the private automobile, improve circulation and provide opportunities to experience Meyers as a pedestrian or cyclist.

Placer County General Plan:

Policy 3.D.9. Consider Complete Streets infrastructure and design features in street design and construction to create safe and inviting environments for all users consistent with the land uses to be served.

Policy 3.26. Placer County will incorporate Complete Streets principles into its Transportation and Circulation Element, Bikeways Master Plan, Regional Bikeway Plan, Community Plans, and other plans, manuals, rules, regulations and programs as appropriate, and will establish performance standards with measurable outcomes.

Design Flexibility & Engineering Judgment is Encouraged

FHWA and Caltrans have documented their encouragement of design flexibility and the use of engineering judgment. This protects engineers from liability as design decisions are documented with real world examples. We must remember that bike lanes are not the only tool. We need to explore many potential solutions and consider how each project is contextual and serves different users.

High Speed Kills on Roadways

High speed roadways are dangerous barriers to pedestrians and bicyclists and is the number one contributor to the feeling of safety. High speed only works on open highways with low traffic volumes. Highways routed

though communities should not feel like highways and should not be designed primarily to accommodate peak traffic demand. Designing mostly for peak demand creates excess width and capacity and encourages speeding as a natural and consistent behavior for drivers during typical off-peak traffic periods. During peak times, there can be travel surges between traffic signals which also creates safety concerns and increases likelihood of vulnerable user collisions. Cars move through an urban corridor at a safer and more consistent flow at lower speeds.

Low Speed Kills when Delivering Projects

It often takes much longer to design and approve a project than it does to build the project. Agencies can use pilot and demonstration projects to more quickly build roadway improvements, test new solutions, and build public support. Also, agencies should utilize maintenance projects, such as roadway resurfacing to temporarily adjust the roadway. Changes should be monitored over time, adjusting for improvements and creating permanent solutions. Snow removal operations which degrade roadway stripping offer significant annual opportunities to repurpose roadways in the spring and summer.

Matching the Community's Character: Tahoe's Population is Variable

Agencies often focus on "how" and "what," but vision is created by asking "why." While Tahoe is home for many, it is also a major tourism destination. To maintain Tahoe's competitiveness while improving the environment, it is critical to provide a transportation system that is consistent with the area's scale and sense of place. Complete streets create an opportunity to better manage the peak season and off season demand by providing choices in mobility.

Maintenance Should Be Part of the Design & Engineering Process

Understanding resource and equipment limitations is important in project design. These discussions are also an opportunity to reprioritize resources and equipment and evaluate the performance metrics used to measure their success.

Reducing Capacity is OK When You Create Safe Transportation Choices

We have built our transportation system to accommodate motor vehicles and as a result our system forces people to drive. By offering people convenient, safe, and enjoyable walking and biking opportunities to reach desired destinations we can reduce vehicle use and dependence.

Lifecycle Cost Decision Making

Project decisions should consider more than initial construction costs. Annual and long term maintenance costs can vary significantly. Sometimes, projects that are more expensive to build may be the less expensive to maintain.

Next Steps

Alta Planning + Design summarized some suggested key next steps for consideration by TRPA/TMPO and local regional partners to continue the momentum and realize progress.

Embolden Design Flexibility & Engineering Judgment by Creating a Learning Environment

It is important to the future of the Tahoe area that practitioners utilize engineering judgment and design flexibility. Documentation of decisions is critical for design immunity. Practitioners should move past applying outdated standards and create new guidelines and standards that are tailored to solve the Tahoe area's unique challenges.

If you are a leader at your organization, create an environment that encourages staff to create adaptive projects that improve over time. Learning and growing agency cultures are focused on balancing risk and reward when trying something new.

Bring Training to Each Agency

While individuals from all regional agencies attended the Transforming Tahoe Transportation Workshop, it is crucial for people to bring information back to their entire agency. Knowledge is power and staff at all levels of each organization need to be in alignment.

Collaboration Between Disciplines is Critical: Concept to Construction to Maintenance

Every project has the opportunity to be a complete streets project. Agencies need to integrate their departments and disciplines so that opportunities for multiple-benefit projects are not missed.

Facilitate an Elected Officials Transportation Summit for Tahoe

The Tahoe area is seeing changes in how people want to live and travel. New research and rules are creating opportunities for new solutions to be part of the discussion.

Create an occasion for elected officials to learn from each other and focus on real and perceived challenges, economic opportunities, environmental constraints, equity imbalances, and safety issues facing the Region. Elected officials can band together on the regional vision and how the transportation system contributes to that vision.

Redefine the Problem(s) to be Solved

Often how a problem is defined dictates the approach and the solutions that are proposed. As projects move forward, agency staff and elected officials need to be aware of how focusing on only one transportation concern at a time can create other problems for different users. Scoping a project to move and connect transportation users of all types more efficiently and safely will yield more holistic results rather than improving capacity for motor vehicles only.

Continue Agency Knowledge Share

TRPA/TMPO are committed to continuing agency knowledge sharing as an annual forum. This will create opportunities to share victories, successes, lesson learned, challenges overcome, and brainstorm solutions to existing challenges. The updated TRPA Code of Ordinances coverage requirements which exempt bicycle trails are a great example of taking steps to reduce barriers to the development of transportation and recreational facilities. More issues like this will come to surface as agencies collaborate and solutions can be found.

Be a Multi-Modal User

What we see or experience from the windshield of a car is often dramatically different than what people experience on foot or on a bike. When designing projects, get out onto the street and truly experience the challenges and opportunities from another perspective.

Actions

As a 12-month assignment, agency participants are challenged to accomplish the following in 2016:

1. Move towards adopting a complete street strategy or policy. If a policy is present, review it to see how it could be more effective and supported through standards, code, and other agency policies.

2. Identify at least one pilot project where small changes could create big improvements. Use it as a learning opportunity to test coordination and cooperation between staff, elected officials and the public. Pilot projects can use interim materials and be flexible in their approach. Report back at next annual complete streets meeting on your lessons learned.

3. Examine the funding realities. Complete streets elements should be seen as essential components of the agency's transportation infrastructure rather than as optional elements which must be funded separately. Take steps towards identifying or creating new local funding sources such as paid parking, fees, taxes, etc.

Participants Networking During Day 1

INTRODUCTION

INTRODUCTION

POLICY GUIDANCE

This appendix to the Linking Tahoe: Active Transportation Plan presents an overview of bicycle and pedestrian facility designs, based on appropriate MUTCD and Highway Design Manuals, and is supplemented by national best practices developed by FHWA and NACTO, as well as state standards and Tahoe-specific design guidelines. The purpose is to provide readers and project designers with an understanding of the facility types that are proposed in the Plan, and with specific treatments that are recommended or required region-wide. This appendix also acts as a stand alone document for implementing agencies to use as a reference guide for designing projects that provide for all roadway user mobility and safety.

Discussion

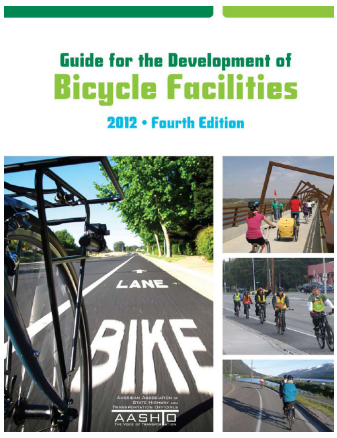
The Lake Tahoe Complete Street Resource Guide presents standards and recommendations that specifically provide for consistency in the Lake Tahoe Region, or where details are needed beyond what is provided by state and federal design standards. All projects must also meet state and federal design standards, as well as other Tahoe Regional Planning Agency (TRPA) design guidelines including scenic requirements and best management practices. Therefore, in addition to these design guidelines, planners and designers should also refer to the following documents and their subsequent updates when planning and designing bicycle and pedestrian facilities. Project designers are encouraged to employ design flexibility in accordance with FHWA and Caltrans directives. Engineering judgment should be employed to ensure that projects are safe and satisfy the needs of all users.

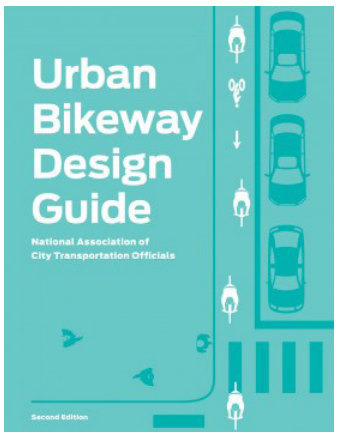
National Guidance

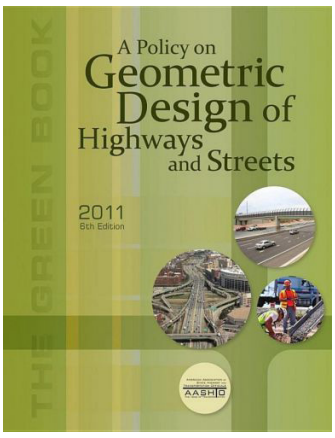
The Federal Highway Administration's (FHWA) **Manual on Uniform Traffic Control Devices (MUTCD)** defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings. The California portion of the Lake Tahoe Region is governed by the California MUTCD and the Nevada portion is governed by the Federal Highway Administration (FHWA) MUTCD. In the event that a specific treatment is in the California or Federal MUTCD, but not in the other, it may be necessary to go through experimental testing procedures. Experimental testing is overseen by the California Traffic Control Devices Committee (CTCDC) in California and the FHWA in Nevada.

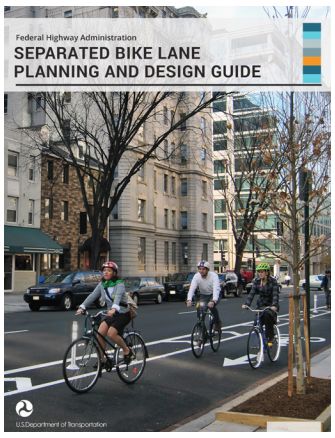
To further clarify the MUTCD, the FHWA created a table of **Bicycle Facilities and the Manual on Uniform Traffic Control Devices**, which lists contemporary bicycle facilities such as bicycle-related signs, markings, signals, and other treatments and identifies their official status (e.g., can be implemented, currently experimental). This table can be found at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/mutcd/index.cfm.

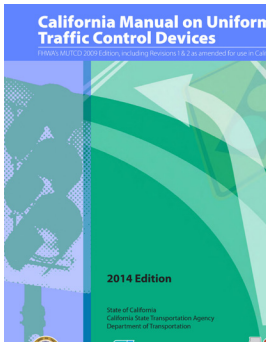
Bikeway treatments not explicitly covered by the MUTCD

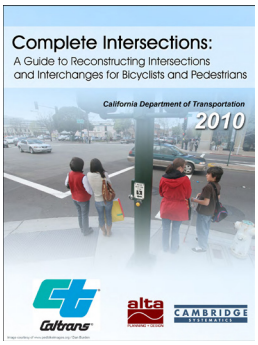


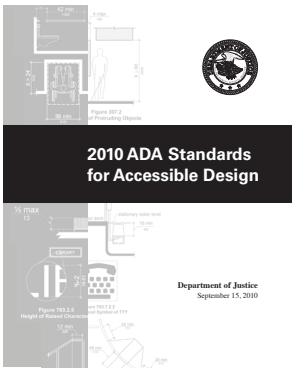












are often subject to experiments, interpretations and official rulings by the FHWA. The **MUTCD Official Rulings** is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available.

American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities (2013)**, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities.

Last updated in 2004, the AASHTO provides guidance on dimensions, use, and layout of specific pedestrian facilities. The standards and guidelines presented by AASHTO **Guide for the Planning, Design and Operation of Pedestrian Facilities (2004)** provide basic information, such as minimum sidewalk widths, driveway construction, crosswalk striping requirements and other recommended signage and pavement markings.

The 2011 **AASHTO A Policy on Geometric Design of Highways and Streets (2011)** commonly referred to as the "Green Book," contains the current design research and practices for highway and street geometric design.

FHWA's 2015 **Separated Bike Lane and Planning Design Guide** is the newest publication of nationally recognized bicycle-specific design guidelines, and outlines planning considerations for protected bicycle facilities, presents a suite of design recommendations based on corridor context, and highlights notable case studies from across the US.

The National Association of City Transportation Officials' **(NACTO) Urban Bikeway Design Guide (2012)** is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs. **NACTO's Urban Streets Design Guide (2013)** is the newest publication of nationally recognized street design guidelines, covering street designs and elements focused on creating walkable, bikeable, transit-friendly places.

Some of the treatments featured in the NACTO guides are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

The Americans with Disabilities Act (ADA) prohibits discrimination against people with disabilities in employment, transportation, public accommodation, communications, and governmental activities. The **Department of Justice 2010 ADA Standards for Accessible Design** and the **DOT ADA Standards for Transportation Facilities** provide accessibility standards for all facilities covered by ADA.

In addition, the United States Access Board published **Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (2011)** but they have been subsequently adopted.

Local Guidance

CALIFORNIA:

The **California Manual on Uniform Traffic Control Devices (CAMUTCD) (2014)** is an amended version of the FHWA MUTCD 2009 edition modified for use in California. While standards presented in the CA MUTCD substantially conform to the FHWA MUTCD, the state of California follows local practices, laws and requirements with regards to signing, striping and other traffic control devices.

The **California Highway Design Manual (HDM) (2015)** establishes uniform policies and procedures to carry out highway design functions for the California Department of Transportation. The 2012 edition incorporated Complete Streets focused revisions to address the Department Directive 64 R-1.

Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians (2010) is a reference guide that presents information and concepts related to improving conditions for bicyclists and pedestrians at major intersections and interchanges. The guide can be used to inform minor signage and striping changes to intersections, as well as major changes and designs for new intersections.

Main Street, California: A Guide for Improving Community and Transportation Vitality (2013) reflects California's current manuals and policies that improve multimodal access, livability and sustainability within the transportation system. The guide recognizes the overlapping and sometimes competing needs of main streets.

The Caltrans Memo: **Design Flexibility in Multimodal Design (2014)** encourages flexibility in highway design. The memo stated that "publications such as the National Association of City Transportation Officials (NACTO) *Urban Street Design Guide* and *Urban Bikeway Design Guide* are resources that Caltrans and local entities can reference when making planning and design decisions on the State highway system and local streets and roads."

NEVADA:

The **NDOT Road Design Guide (2010)** establishes uniform design criteria and interpretation on AASHTO Green Book geometric design elements.

The **NDOT Standard Plans for Road and Bridge Construction (undergoing update in 2015)** include CAD drawings of street design cross sectional elements and details.

The **NDOT Standard Specifications for Road and Bridge Construction (2014)** includes important details for contractor processes and standards in the design and construction of roads.

The **NDOT Landscape and Aesthetics Master Plan (2002)** established policies, procedures, standards, and guidelines for landscape and aesthetic treatments on Nevada's roads and highways

TAHOE AREA:

The Tahoe Metropolitan Planning Organization (TMPO) serves as the federally-designated metropolitan planning organization for the Tahoe region while TRPA carries out planning requirements of the Bi-State Tahoe Regional Planning Compact (Public Law 96-551) and serves as the regional transportation planning agency for the California portion of the Lake Tahoe Region. The most recent **Lake Tahoe Regional Plan** was adopted in 2012 by TRPA/TMPO and addressed several policies including ecosystem restoration and economic development. The TRPA/TMPO Regional Transportation Plan, **Mobility 2035,** is the transportation component of the Regional Plan. The RTP contains goals and policies that support the creation of walkable communities and increased transportation choice through sidewalk infill and bike trail projects.

Lake Tahoe Community Plans and Area Plans are part of the TRPA Regional Plan and outline bicycle and pedestrian policies and projects for specific neighborhoods in the Tahoe Region. The next revision of the RTP is scheduled for 2016.

The **TRPA Code of Ordinances** compiles all the laws and ordinances needed to implement the Goals and Policies of the Regional Plan. The Code was last updated in 2013.

BIKEWAY CLASSIFICATION OVERVIEW

Caltrans has defined three types of bikeways in Chapter 1000 of the Highway Design Manual: Class I/Shared-Use Path, Class II/Bike Lane, and Class III/Bike Route. Nevada does not have similar class designations, but uses the AASHTO terms, which include "shared-use path", "bike lane" and "signed shared roadway". For consistency with other Regional and prior plans, this document uses the generic terms "shared-use path", "bike lane" and "bike route". Both AASHTO and Caltrans have similar design standards for these facilities. Facilities using federal or state funding will generally be required to meet the standards below. TRPA recommends that all facilities, regardless of funding source, meet the standards below.

Design Summary

Path Width

8 feet is the minimum allowed for a two-way bicycle path and is only recommended for very low traffic situations.

10 feet is recommended in most situations and will be adequate for moderate to heavy use.

12 feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians. A separate track (5' minimum) can be provided for pedestrian use.

Bike Lane Width with Adjacent On-Street Parking

6.5' preferred width, 5' minimum recommended when parking stalls are marked

Bike Lane Width without Adjacent Parking

Recommended Width: 6' where right-of-way allows

4' minimum when no gutter is present (rural road sections)

5' minimum when adjacent to curb and gutter (3' more than the gutter pan width if the gutter pan is greater than 2')

Lane Width for Bicycle Route With Wide Outside Lane

Fourteen feet (14') minimum is preferred. This can include a striped shoulder. Fifteen feet (15') should be considered if heavy truck or bus traffic is present. Bike lanes should be considered on roadways with outside lanes wider than 15 feet. This treatment is found on all residential streets, collectors, and minor arterials.

Shared-Use Path

Bike Lane

Bike Route/Shared Signed Roadway

Discussion

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

Shared-Use Paths (Class I) are facilities separated from roadways for use by bicyclists and pedestrians. These facilities provide a completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow minimized. A total width of 10 feet is required, but 12 feet is recommended.

On-Street Bikeways (Class II), such as conventional or buffered bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists. Another variant of on-street bikeway is **Separated Bikeways (Class IV)** which are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes. Bicycle lanes of 6-7 feet are recommended, while minimum dimensions are 4-5 feet depending on if a gutter is present.

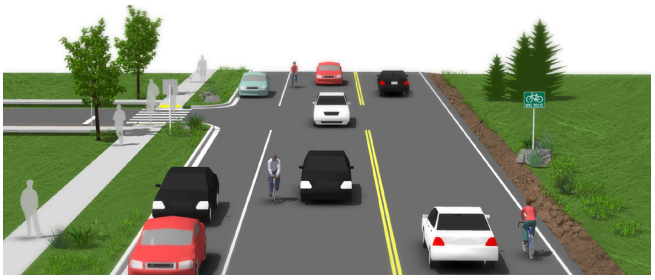
Signed Shared Roadways (Class III) are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors. The recommended width of a shared use travel lane is 14 feet.

Bike Routes are designated bicycle route alignments within a street network, identified as the preferred streets and facilities to be used for bicycle travel. A bike routes is a designation, not a facility type, and may be made up of various facilities in order to provide a connected network for bicycle travel.

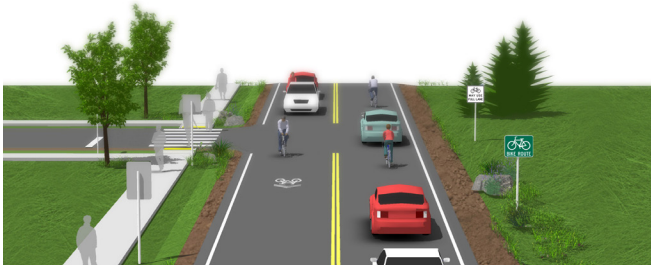
Shared-Use Paths (Class I)

On-Street Bikeway (Class II)

Separated Bikeway (Class IV)



Signed Shared Roadway (Class III)



Signed Shared Roadway with Pavement Markings (Class III)

References

- Caltrans. Highway Design Manual. 2015
- FHWA. Manual of Uniform Traffic Control Devices. 2009.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Shared-use path (10' wide): $475,000 - $3,000,000 per mile
- Bike Lane: $5,000 - $500,000 per mile
- Bike Route: $1,000 - $300,000 per mile

SHARED-USE PATHS

SHARED-USE PATHS

PATHWAY DESIGN

A shared-use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. Within the Lake Tahoe Region, shared-use paths are often found in urbanized areas and connecting urbanized areas to popular recreation sites or other population centers. Shared-use paths can also include amenities such as lighting, signage, and fencing (where appropriate).

General Design Practices

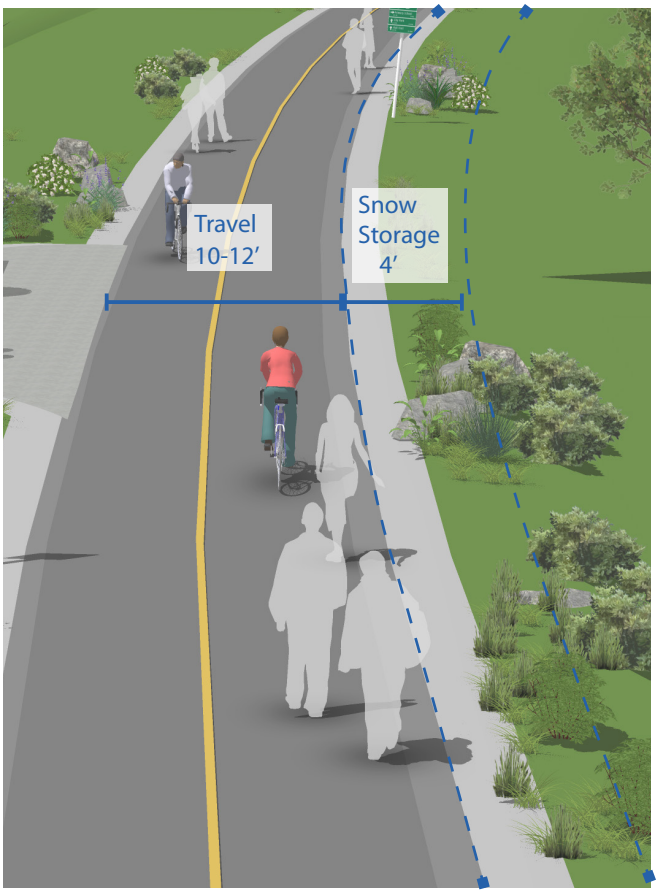
Shared-use paths can provide a desirable facility for users of all skill levels preferring separation from traffic. Some of the elements that enhance off-street path design include:

- Frequent access points from the local road network;
- Placing directional signs to direct users to and from the path;
- Limiting the number of at-grade crossings with streets or driveways;
- Identifying and addressing potential security problems up front;
- Whenever possible, and especially where heavy use by bicycle users can be expected, separate pedestrian ways should be provided to reduce conflicts.

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared-use paths directly adjacent to roadways, although at Lake Tahoe, due to geographical constraints, this is often necessary. Also known as "sidepaths", these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic. This can result in an unsafe situation where motorists entering or crossing the roadway at intersections and driveways do not notice bicyclists coming from their right, as they are not expecting traffic coming from that direction. The guide explores solutions to this problem on page 18.

As bicyclists gain experience and realize some of the advantages of riding on the roadway, many stop riding on paths adjacent to roadways. Bicyclists may also tend to prefer the roadway as pedestrian traffic on the bicycle path increases. When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced bicyclists and those who are bicycling for transportation purposes. Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.

Bicycle paths must also include the proper "Best Management Practices" (BMPs) for treating runoff from the facility. These designs are not included here, but path designers can find more information on the TRPA's BMP website at: http://www.tahoebmp.org.



Discussion

Twelve-foot wide paths are usually best for accommodating all uses, and better for long-term maintenance and emergency vehicle access. When motor vehicles are driven on shared-use paths, their wheels often will be at or very near the edges of the path. Since this can cause edge damage that, in turn, will reduce the effective operating width of the path, adequate edge support should be provided. Edge support can be either in the form of stabilized shoulders, a concrete "ribbon curb" along one or more edges of the path, or constructing additional pavement width or thickness. Constructing a typical pavement width of 12 feet, where right-of-way and other conditions permit, lessens the edge raveling problem.

Surfacing and Path Construction

Thicker surfacing and a well-prepared sub-grade will reduce deformation over time and reduce long-term maintenance costs. At a minimum, off-street paths should be designed with sufficient surfacing structural depth for the sub-grade soil type to support maintenance and emergency vehicles.

Asphalt and concrete are the most common surface treatment for multi-use paths, however the material composition and construction methods used can have a significant determination on the longevity of the pathway. Concrete is not as durable in cold climates and may not be suitable on a large scale for Lake Tahoe. Alternative surface materials such as decomposed granite may be appropriate in some circumstances. Each jurisdiction needs to consider durability and snow removal needs (grooming vs. clearing) when selecting an alternative surface material such as decomposed granite. Surface selection should take place during the design process.

Recommendation

The following pathway construction design is recommended for improved durability and low maintenance at Lake Tahoe:

• Asphalt Option: 4 inches of type B asphalt over a minimum of 9 inches of 1.5 inch minus crushed gravel base material. An asphalt path has the advantage of melting out more quickly after a snowfall under sunlight than a concrete path.

If trees are adjacent to the path, a root barrier should be installed along the path to avoid root uplift.

Design Summary

Width

- 10 feet width preferred, 8 feet minimum.
- 12 feet or more is recommended in areas with heavy anticipated bicycle and/or pedestrian traffic (Caltrans, 2015). AASHTO recommends a paved width of 10 feet minimum, with up to 14 feet being the preferred width.
- A 3-4 foot native surface path may be considered alongside shared-use paths for runners.

Separation From Highway

When two-way shared-use paths are located adjacent to a roadway, wide separation between a shared-use path and the adjacent highway is desirable. Bike paths closer than 5 feet from the edge of the shoulder shall include a physical barrier to prevent bicyclists from encroaching onto the highway (Caltrans, 2015). Where used, the barrier should be a minimum of 42 inches high (AASHTO, 2012).

Snow Storage

If a facility is to be plowed or blown in the winter, shoulder or clear width should be increased to provide adequate snow storage. In constrained locations, snow may need to be trucked out instead of stored on-site. As an alternative to snow clearance, a facility may be groomed to allow cross-country skiers and snowshoers to use it.

References

- Caltrans. Highway Design Manual. 2015.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.

Cost

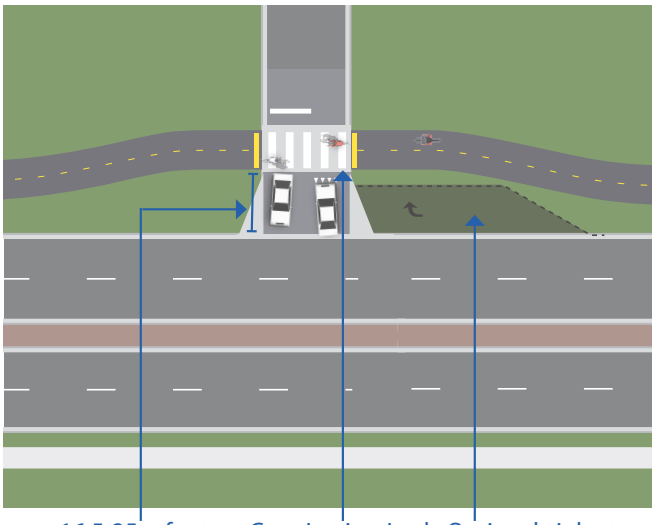
Shared-use Path (10' wide): $475,000 - $3,000,000 per mile

Costs can vary substantially based on the materials used, right-of-way costs, path width and other factors. A paved, multi-use trail can range in cost from approximately $65,000 per mile to more than $4 million per mile. An unpaved path can range from approximately $30,000 to $400,000 per mile.

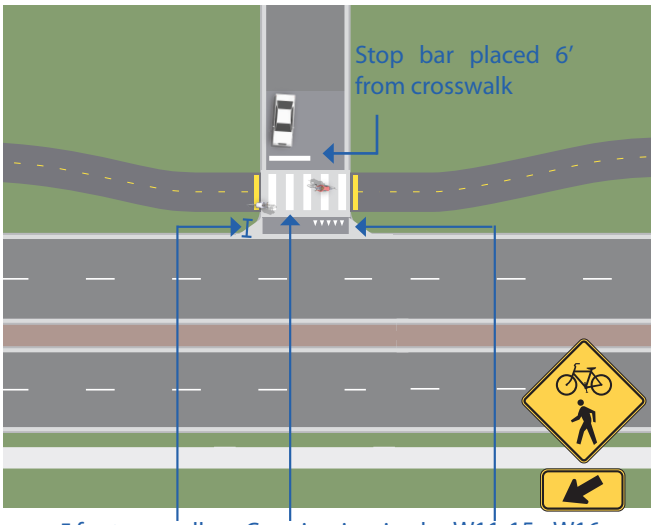
SIDE PATHS AT DRIVEWAYS AND MINOR STREETS

Shared use paths along roadways, also called Sidepaths, are a type of path that run adjacent to a street. Because of operational concerns it is generally preferable to place paths within independent rights-of-way away from roadways. However, there are situations where existing roads provide the only corridors available.

Setback Path Crossing


16.5-25 foot setback from roadway.
Crossing is raised and bikeway remains level.
Optional right turn deceleration lane on high speed roadways.

Adjacent Path Crossing


Stop bar placed 6' from crosswalk
5 foot or smaller setback from roadway.
Crossing is raised and bikeway remains level.
W11-15, W16-7P used in conjunction with yield lines

Discussion

Guidance for sidepaths should follow that for general design practices of shared use paths.

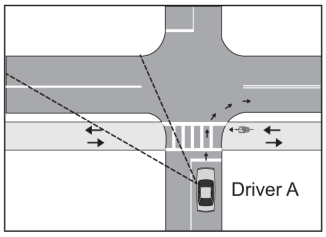
Crossing design should emphasize visibility of users and clarity of expected yielding behavior. Where possible, path users should have right-of-way priority over traffic on side streets. Crossings may be STOP or YIELD controlled for motor vehicles depending on sight lines and bicycle motor vehicle volumes and speeds.

Design Summary

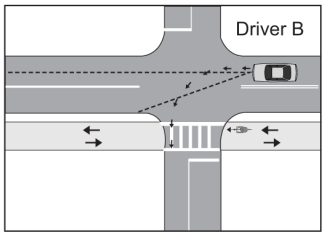
- In general, there are two approaches to driveway crossings: setback crossings and adjacent crossings, illustrated above.
- **Setback Crossing** - A set back of 25 feet separates the path crossing from merging/turning movements that may be competing for a driver's attention.
- **Adjacent Crossing** - A separation of 5 feet or less emphasizes the conspicuity of riders at the approach to the crossing.

Sidepath Conflicts (AASHTO 2012)

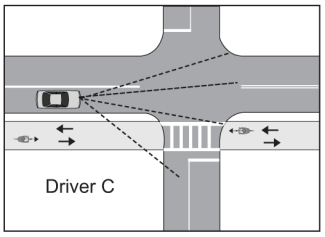
The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings. The setback path crossing configuration shown on page 18 is the preferred design to mitigate these design concerns.



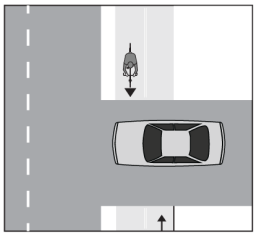
Right turning Driver A is looking for traffic on the left. A contraflow bicyclist is not in the driver's main field of vision.



Left turning Driver B is looking for traffic ahead. A contraflow bicyclist is not in the driver's main field of vision.



Right turning Driver C is looking for left turning traffic on the main road and traffic on the minor road. A bicyclist riding with traffic is not in the driver's main field of vision.



Stopped motor vehicles on side streets or driveways may block the path.

Additional Considerations

- Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path. Therefore, appropriate connecting facilities must be provided.
- The provision of a shared use path adjacent to a road is not a substitute for the provision of on-road accommodation such as paved bike lanes, but should be considered in some locations in addition to on-road bicycle facilities.
- To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street. **(AASHTO 2012)**

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- FHWA. Roundabouts: An Informational Guide. 2000.
- TRB. Roundabouts: An Informational Guide, Second Edition. NCHRP 672. 2010.

Cost

Costs can vary substantially based on the materials used, right-of-way costs, and other factors. A paved, multi-use trail can range in cost from approximately $65,000 per mile to more than $4 million per mile.

TREAD-SEPARATED SHARED-USE PATH

As user volumes on shared-use paths increase, the degree of mobility, usability and comfort for those users decreases. In high volume scenarios, shared-use paths should separate users through lane delineation, materials, or physical separation.

Discussion

Tread-separated shared-use paths are typically used when there are high volumes of users, or high potential demand for the facility. They are also appropriate for segments of paths that connect to conventional or separated bike lanes.

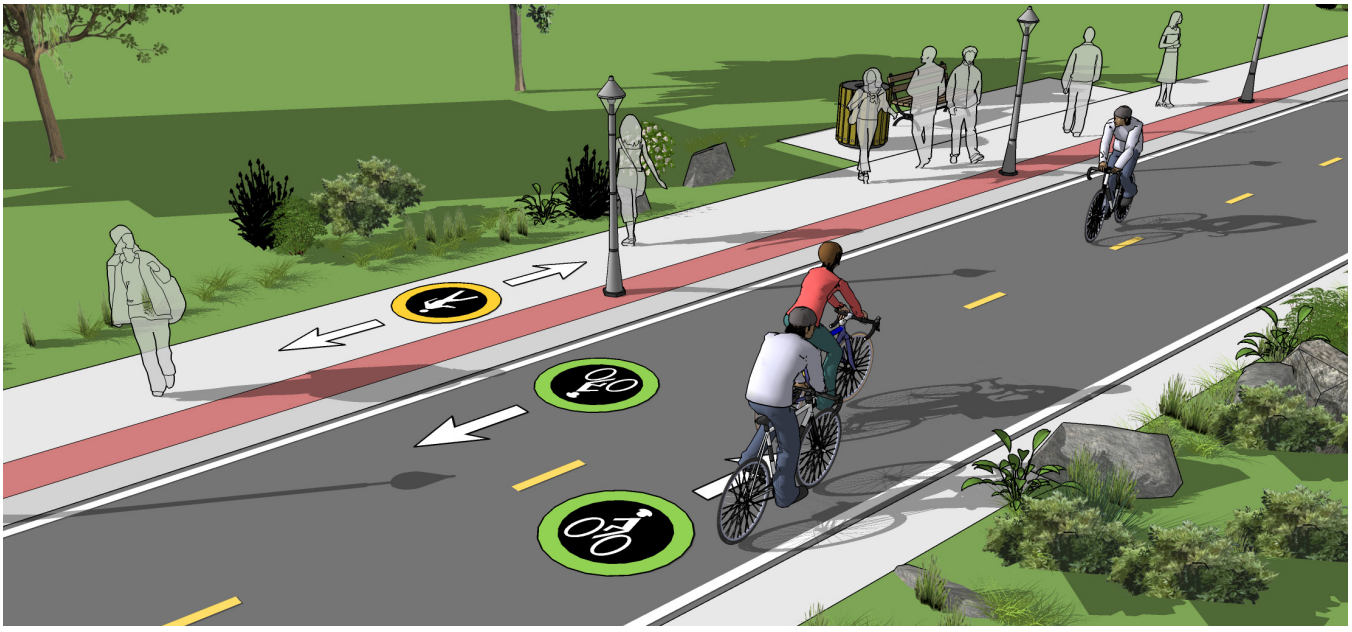
User separation increases mobility during path segments, but may introduce additional conflicts at intersections or connections to other paths. Clear signing and markings should be used to specify yielding expectations

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Design Summary

- 15 feet minimum width to allow for tread separation: 10 feet wide path for bicycle only use, with 5 ft section for pedestrian-only use.
- User delineation may be lane striping or differing paving materials. If different materials are used, consider concrete for pedestrians and asphalt for bicyclists.
- In areas with extra width available, user treads may be separated further, with materials such as cobblestones, or planted landscaping.
- Lighting is recommended and provides security and safety benefits, allowing the facility to be used after dusk, particularly during the winter months.
- Clear signs should be used to specify user positioning.
- If markings are used, use small-scale symbols instead of full-sized roadway markings.



SHARED-USE PATHS

BOARDWALKS

Boardwalk construction may be used in sensitive areas such as stream environment zones and in areas of steep slopes. Boardwalk construction is typically much more expensive than standard paved paths. Boardwalks should have a surface that is comfortable and safe for bicyclist use and should be considered in relation to environmental needs, budget, and potential use needs and management issues.

Design Summary

Design Criteria

If bicyclists are allowed, design criteria for boardwalks should meet AASHTO design recommendations for paved shared-use paths. Paths should also be designed to structurally support the weight of a small truck or a light-weight maintenance vehicle.

Width

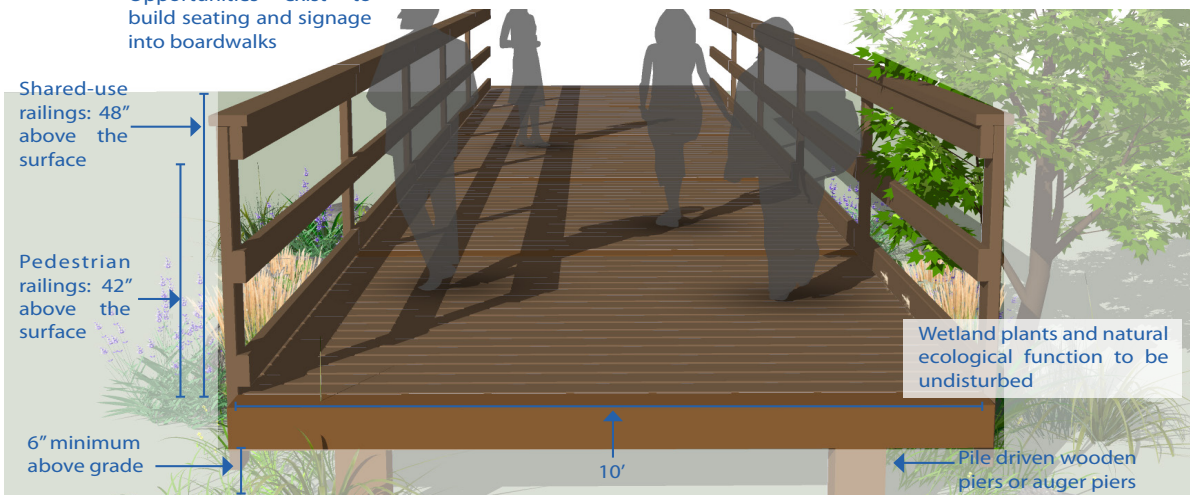
Path width should be a minimum of 10 feet when no rail is used. A 12 foot width is preferred in areas with high anticipated use and whenever rails are used. AASHTO recommends carrying the clear area (or 2 foot space on either side of path) across the structure. This provides an appropriate horizontal shy distance from the railing and allows for maneuvering space to avoid conflicts with users stopped on the structure. A 10 foot width is recommended only for low-use areas.

Height from Ground

Path height should be set to allow for small animal movement under the structure and passage of expected water flows, a minimum of 6" above grade.

Railings

Paths less than 30" above grade may not require a railing according to current building standards. Six inch curb rails may be used. Paths higher than 30" above grade require a 42" high rail. It should be noted that AASHTO recommends 42" high railings on any structured path.


Opportunities exist to build seating and signage into boardwalks
Shared-use railings: 48" above the surface
Pedestrian railings: 42" above the surface
6" minimum above grade
10'
Wetland plants and natural ecological function to be undisturbed
Pile driven wooden piers or auger piers

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- Department of Justice. ADA Standards for Accessible Design. 2010.

Cost

Dependent on use of railings, materials, width, height, and anticipated loads. Can vary between $2.25M and $4M per mile for a 10 foot wide path.

SHARED-USE PATHS

CAUSEWAYS

Causeways or "burm" type path construction may be used to minimize disturbance of water flow in stream environment zones. Paths are elevated above wet ground using a permeable fill material as a base. Path edges incorporate small boulders or a rock riprap to contain the permeable fill. Geotextile mats and other construction materials such as geocells can be incorporated to ensure a stable base on which asphalt or concrete paving may be applied. The path should be built up to an elevation no greater than 30 inches above natural grade.

Design Summary

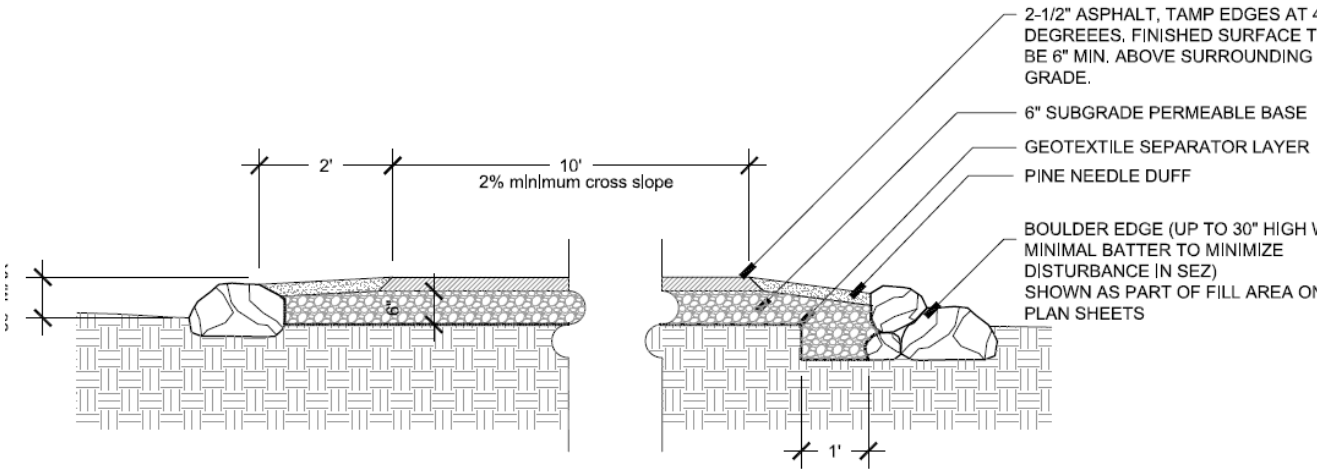
Design Criteria

Design criteria for causeways should meet AASHTO and Caltrans design recommendations for paved shared-use paths.

Base

Path construction and detailing depends on water table and surface flows through site. A stable base for paving must be established while allowing for water flow under path. Base materials should be designed so as not to be compromised by future water flows. Firm mineral soil, coarse-grained soils or granular material, or small, well-graded angular rocks are needed for fill.

It should be noted that AASHTO recommends 42" high railings on any structured path.



References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- United States Forest Service. Trail Construction and Maintenance Notebook. 2007.
- Caltrans. Highway Design Manual. 2015.

Cost

Dependent on surface type. Native surface and decomposed granite surfaces are less expensive than paving. Paved applications would include the typical cost of a paved path plus the riprap edge support.

AGGREGATE SURFACE TRAILS

Aggregate surface trails are most applicable in non-urban environments and in multi-use areas where a variety of recreational use is anticipated. This includes hiking, biking, mountain biking, and equestrian use. Aggregate surface trails composed of crushed rock using pine tar or other trail stabilization techniques can fit in well with a natural setting and can cost less to construct than an asphalt trail.

Discussion

Sustainable design must consider these forces – compaction, displacement, and erosion – that are caused by water and trail use. Compaction will deepen the heavily traveled portion of the trail. Displacement deepens the tread and raises the untraveled edges. Erosion follows and further deepens the tread. Understanding the site soils, topography, water movement, and anticipated use patterns should be considered during the trail design.

This type of trail may be considered for both permanent and temporary use. As a temporary facility, future phasing would then include returning to the site and paving the surface. This allows for major grading and stabilization to be completed during the first phase and paving completed during the second phase.

Design Summary

Width

Trail widths vary depending upon anticipated type and volume of use.

References

- United States Forest Service. Trail Management Handbook (FSH) 2309.18. 2008.
- Minnesota Department of Natural Resource. Trail Planning, Design, and Development Guidelines. 2007
- United States Forest Service. Trail Construction and Maintenance Notebook. 2007

Cost

$75,000 - $150,000 per mile

LIGHTING

Lighting improves the safety of the path user by increasing visibility during non-daylight hours. The fixtures should be installed near benches, drinking fountains, bicycle racks, trailheads, and roadway and path crossings. TRPA recommends lighting in urbanized areas only. Lighting must be downcast to minimize light pollution and must follow the recommendations in the applicable Community Plan or Area Plan.

Photo by Dan Burden via PBIC Image Library

Design Summary

Depending on the location, average maintained horizontal illumination levels of 5 lux to 22 lux should be considered (AASHTO, 2012). Where special security problems exist, higher illumination levels may be considered.

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

SHARED-USE PATHS

BOLLARDS

Minimize the use of bollards to avoid creating obstacles for bicyclists. Bollards, particularly solid bollards, have caused serious injury to bicyclists. The California MUTCD explains, "Such devices should be used only where extreme problems are encountered" (Section 9C.101). Instead, design the path entry and use signage to alert drivers that motor vehicles are prohibited. Please see the next page for alternative design solutions to bollards.

Discussion

Flexible bollards and posts are designed to give way on impact and can be used instead of steel or solid posts. These bollards are typically made of plastic that is bolted to the roadway and bend and return to their original position when hit. They are intended to deter access, but allow vehicles through in an emergency.

Bollards are typically installed using one of two methods: 1) The bollard is set into concrete footing in the ground; and 2) the bollard is attached to the surface by mechanical means (mechanical anchoring or chemical anchor).

The TRPA recommends flexible bollards or no bollards as opposed to solid posts.

Design Summary

- Where removable bollards are used, the top of the mount point should be flush with the path's surface so as not to create a hazard or potentially be damaged by snow removal devices when the bollard is not in place. Posts shall be permanently reflectorized for nighttime visibility and painted a bright color for improved daytime visibility.
- Striping an envelope around the post is recommended.
- When more than one post is used, an odd number of posts at 1.5m (5-foot) spacing is desirable. Wider spacing can allow entry by adult tricycles, wheelchair users and bicycles with trailers.

Examples of Flexible Bollards

References

- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bollard, fixed: $220 - $800 each
- Bollard, removable: $680 - $940 each

BOLLARD ALTERNATIVES

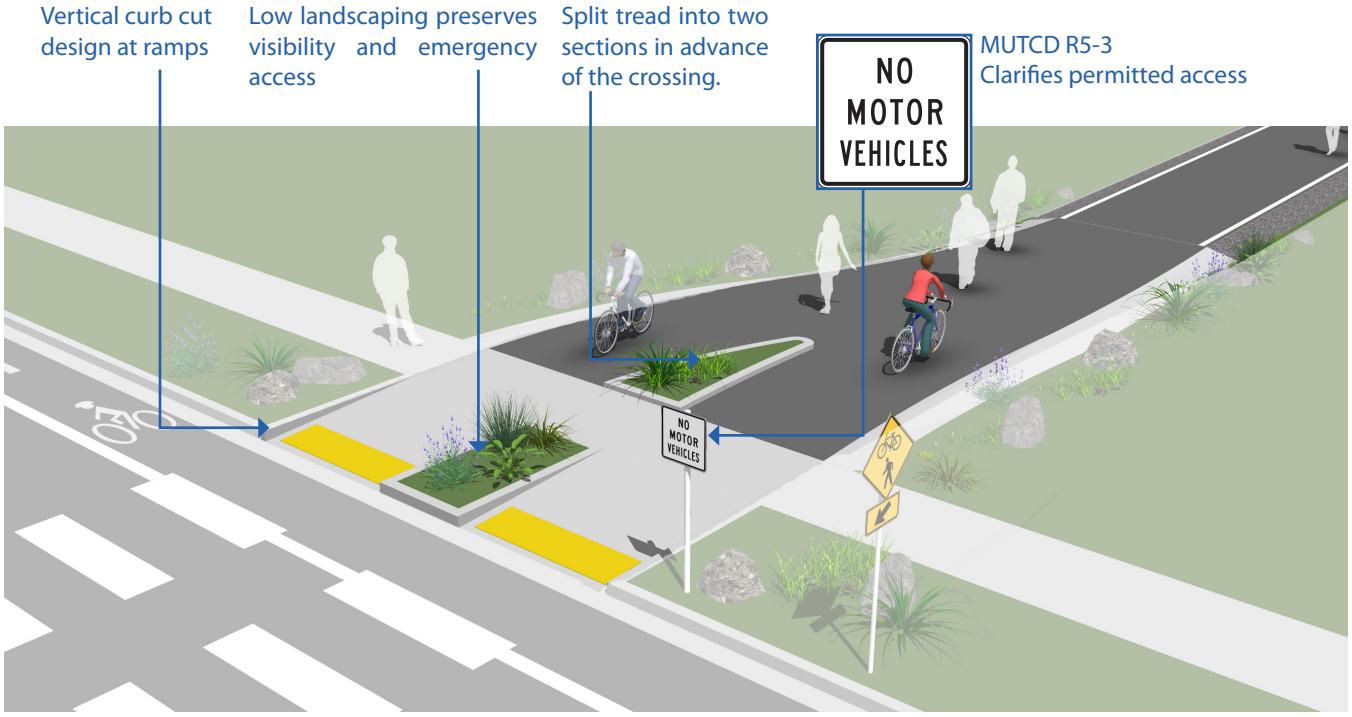
Bollards are physical barriers designed to restrict motor vehicle access to the multi-use path. Unfortunately, physical barriers are often ineffective at preventing access, and create obstacles to legitimate trail users. Alternative design strategies use signage, landscaping and curb cut design to reduce the likelihood of motor vehicle access.

Discussion

Bollards or other barriers should not be used unless there is a documented history of unauthorized intrusion by motor vehicles. If unauthorized use persists, assess whether the problems posed by unauthorized access exceed the risks and issues posed by bollards and other barriers.

Design Summary

- "No Motor Vehicles" signage (MUTCD R5-3) may be used to reinforce access rules.
- At intersections, split the path tread into two sections separated by low landscaping.
- Vertical curb cuts should be used to discourage motor vehicle access.
- Consider targeted surveillance and enforcement at specific intrusion locations


Vertical curb cut design at ramps
Low landscaping preserves visibility and emergency access
Split tread into two sections in advance of the crossing.
NO MOTOR VEHICLES
MUTCD R5-3
Clarifies permitted access
NO MOTOR VEHICLES

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Reconstructing a path crossing entry can range from $2,000 to $4,000.

RECOMMENDED YIELD POLICIES

TRPA is collaborating with partner jurisdictions through the Bikeway Partnership on an education campaign aimed at reducing user conflicts on shared-use paths between pedestrians and bicyclists. Custom signage may be installed to guide path users on proper etiquette, especially in areas where conflicts are likely to occur. Local agencies should coordinate with advocacy groups to develop consistent Trail "rules" and campaign materials. Funding and staff capacity is also necessary to implement signage and outreach programs.

Discussion

FHWA has developed and promoted campaigns that educate active transportation users how to travel safely. The FHWA has several pedestrian and bicyclist tools to assist educators, such as "Safer Journey" videos, and interactive websites. The campaigns promote three basic themes: Be Visible, Be Predictable and Follow the Rules of the Road. California State Parks also has basic rules for the trail to reduce user conflict between pedestrians, bicyclists, and equestrians and has implemented signage throughout their vast network of trails.

A centerline marking is particularly beneficial in the following circumstances: A) Where there is heavy use; B) On curves with restricted sight distance; and C) Where the path is unlighted and nighttime riding is expected. A centerline stripe may also be applied uniformly across the entire facility.

Design Summary

Signage

Etiquette signage and education campaigns are recommended by TRPA/TMPO as ways to encourage path users to yield to each other and to keep the paths clear. They also help to encourage predictable user behavior, especially in areas of high use or where conflicts have occurred. Cyclists, pedestrians, and equestrians (where applicable) are advised to adhere to the path rules and share the trail. Under certain conditions such as during times with lower activity and faster bicyclists, it may be advantageous to walk against traffic, however, it is likely not the safest practice for all conditions and thus should not be regulated with signage. To accommodate counterflow walking, no center line should be marked on the path in order to permit maximum flexibility in path user positioning during passing and approaching maneuvers.

User Etiquette Signs Along Multi-Use Paths

References

- FHWA. Manual of Uniform Traffic Control Devices. 2009.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Signs, trail regulation: $150 each
- Signs, trail wayfinding / information: $500 - $2,000 each

SUMMARY OF COVERAGE REQUIREMENTS

Coverage is regulated in Chapter 30 of the TRPA Code of Ordinances. In 2013, the Code was updated to provide exemptions for the provision of ADA facilities and non-motorized public trails. This is an important development that makes planning and building these types of facilities easier for implementors, both public and private.

Discussion

In the Lake Tahoe Region, due to the need to maintain the natural filtration function of soils to reduce runoff into the Lake, there are limits on the amounts of new pavement, or "coverage" that may be constructed. Where the coverage limitation on a parcel or project area is exceeded, new coverage must be transferred in, and mitigated by removing other coverage within the same watershed, or by purchasing banked coverage. Depending on the land capability of the project area, new coverage must be mitigated by removing other coverage at a ratio of 1:1 or 1.5:1.

In certain situations, private property owners will donate or sell easements for implementation of a bicycle path or sidewalk. In this case, any coverage used to construct the path within the easement does not count towards the property owner's total allowable coverage, since the easement area is effectively part of a "project area" that is separate from the parcel. Memorandums of Understanding (MOUs) may be put in place for either the public entity or the private parcel owner to conduct maintenance, such as the snow removal.

References

- TRPA. Code of Ordinances. 2013.

Detailed Guidance

Section 30.4.1. Base Land Coverage Requirements

This section describes the amount of allowable coverage for different land capability districts. Lower land capability districts, such as wetlands or steep slopes, are allowed only 1% of their area to be covered by impermeable surfaces. The highest land capability districts, where water filtration is the best, may have up to 30% of their area covered by impermeable surfaces.

Section 30.4.2. Transferred Land Coverage Requirements

Subsection (2), Linear Public Facilities, establishes that this use is eligible for transferring coverage. Bicycle paths, sidewalks, and bicycle lanes are linear public service facilities.

Section 30.5. Prohibition of Additional Land Coverage in Land Capability Districts 1a, 1c, 2 and 3 and 1b (Stream Environment Zones)

Subsections 30.5.1(C) and 30.5.2(C) describe the conditions under which additional land coverage may be transferred into the most sensitive land capability districts for linear public service facility projects.

Section 30.4.6. Exemptions and Partial Exemptions from Calculations of Land Coverage

Subsection C notes that the provision of ADA-required features are typically exempt from the calculation of land coverage. Under Subsection D3, Non-Motorized Public Trails are exempt from the calculation of land coverage subject to design limitations.

SHARED-USE PATH
CROSSINGS

SHARED-USE PATH CROSSINGS

PATH CROSSING AT INTERSECTION

The evaluation of a roadway crossing involves analysis of vehicular traffic and path user travel patterns, including speeds, street width, traffic volumes (average daily traffic, peak hour traffic), line of sight, and path user profile (age distribution and destinations). When engineering judgment determines that the visibility of the intersection is limited on the shared-use path approach, Intersection Warning signs should be used.

Design Summary

A path should cross at a signalized intersection if there is a signalized intersection within 350 feet of the path and the crossroad is crossing a major arterial with a high ADT.

Signage

Intersection Warning (W2-1 through W2-5) signs may be used on a roadway, street, or shared-use path in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic, no less than 50 feet before the intersection. A path-sized stop sign (R1-1) should be placed about 5 feet before the intersection.

Traffic Calming

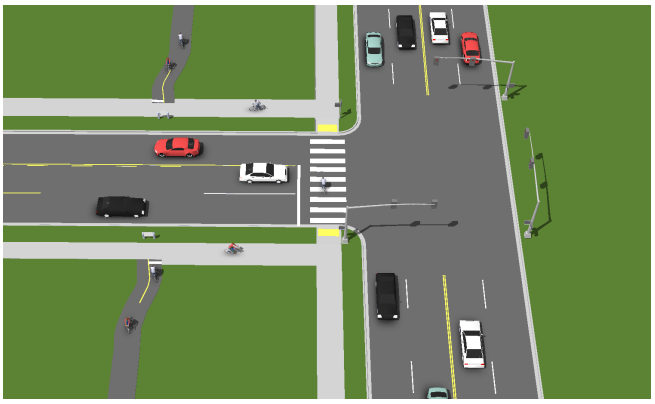
Reducing the speed of the conflicting motor vehicle traffic should be considered. Options may include: transverse rumble strips approaching the path crossing; sinusoidal speed humps (compatible with slow speed snow removal operations).[1]

Crosswalk Markings

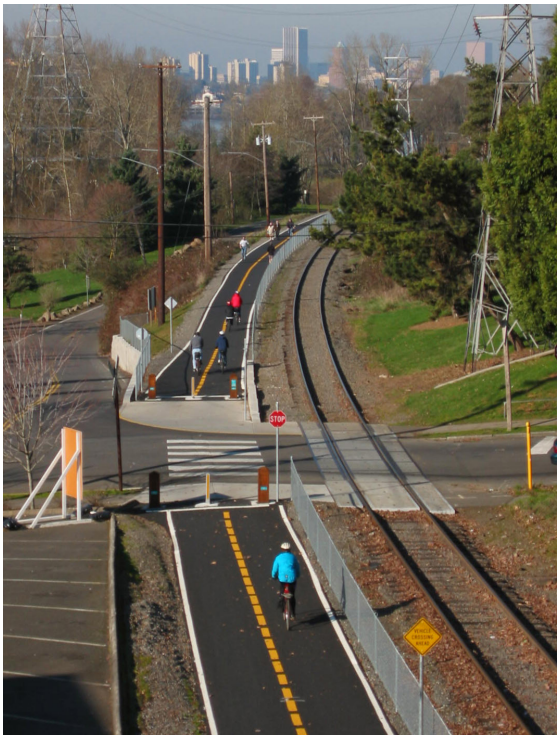
Colored and/or high visibility crosswalks are recommended.

Path Speed Control

A chicane, or swerve in multi-use path approaching the crossing is recommended to slow bicyclist speed. Path users traveling in different directions should be separated either with physical separation (such as a raised median) or a centerline. If a centerline is used, it should be striped for the last 100 feet of the approach.



Recommended "Typical" At-Grade Crossing of a Major Arterial at an Intersection Where Path is Within 350 Feet of a Roadway Intersection



1 Humps with a sinusoidal profile are similar to round-top humps but have a shallower initial rise (similar to a sine wave). They were developed to provide a more comfortable ride for cyclists in traffic calmed areas.

SHARED-USE PATH CROSSINGS

STOP VERSUS YIELD MARKINGS AT CROSSINGS

Where conditions require path users, but not roadway users, to stop or yield, the STOP sign or YIELD sign should be placed on the path. When placement of STOP or YIELD signs is considered, priority at a shared-use path/roadway intersection should be assigned with consideration of the relative speeds of shared-use path and roadway users, relative volumes of shared-use path and roadway traffic, and whether the crossing is parallel to or across a major roadway.

Discussion

Speed should not be the sole factor used to determine priority, as it is sometimes appropriate to give priority to a high-volume shared-use path crossing a low-volume street, or to a Regional shared-use path crossing a minor collector street. This is most prevalent when crossing a minor street in parallel with a major street, such as a sidepath. In some cases it may be appropriate to control the roadway only, while not controlling the path. The least restrictive appropriate controls should be used. STOP signs should not be used where YIELD signs would be acceptable.

The *Side Paths at Driveways and Minor Streets* reference sheet provides more guidance.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities,. 2012.

Design Summary

Path Crossing Signage

STOP (R1-1) signs shall be installed on shared-use paths at points where bicyclists are required to stop. YIELD (R1-2) signs shall be installed on shared-use paths at points where bicyclists have an adequate view of conflicting traffic as they approach the sign, and where bicyclists are required to yield the right-of-way to that conflicting traffic.

R1-1

R1-2

Cost

- Stop limit bars/yield teeth: $200-$530 per set
- Stop pavement markings: $420 each
- Pavement Markings (Thermoplastic): $3.39 per square foot
- Signs, Path Crossing: $780 each
- Signs, Path Stop/Path Yield: $520 each
- Signs, Path Regulation: $150 each

MARKED/UNSIGNALIZED MID-BLOCK CROSSINGS

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions. When space is available, using a median refuge island improves user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 opportunities to cross per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons, and excellent sight distance. For more information see the discussion of active warning beacons.

This treatment is appropriate for crossings located in school zones.

Design Summary

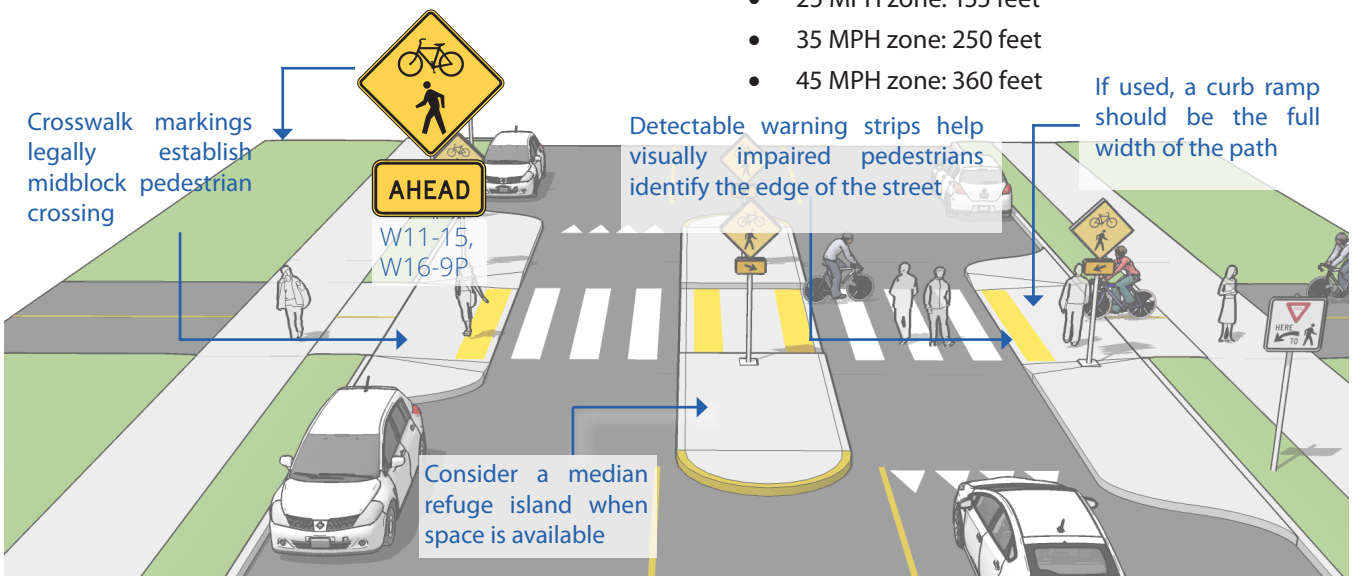
Maximum traffic volumes

- ≤9,000-12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed: 35 MPH

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet


Crosswalk markings legally establish midblock pedestrian crossing
AHEAD
W11-15, W16-9P
Detectable warning strips help visually impaired pedestrians identify the edge of the street
If used, a curb ramp should be the full width of the path
Consider a median refuge island when space is available

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NDOT. Process for the Evaluation of Uncontrolled Crosswalk Locations. 2014.

Cost

- Signage: $125 each
- Marked Crosswalk, $550 each
- Stop limit bars/yield teeth: $200-$530 per set
- Median Refuge Island (optional): $8,500 - $33,000 each

ACTIVE WARNING BEACONS

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways. Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).

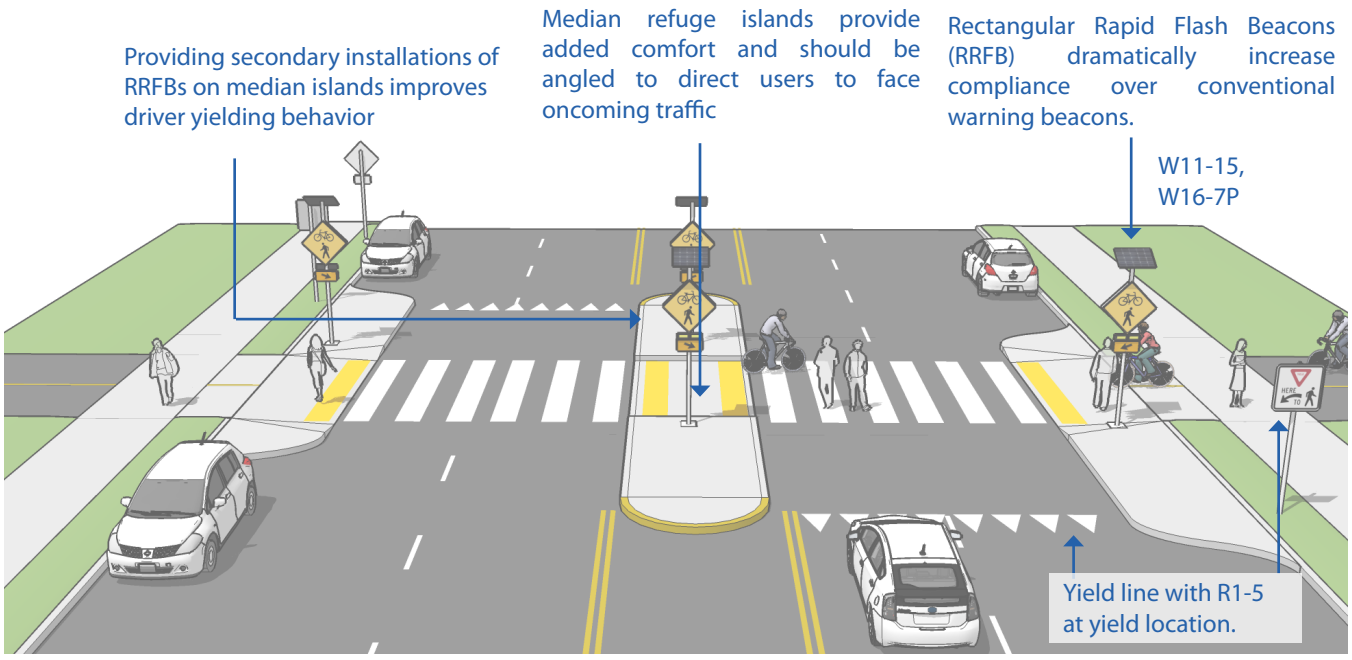
Discussion

Rectangular rapid flash beacons have the highest compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent.

Design Summary

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.


Providing secondary installations of RRFBs on median islands improves driver yielding behavior
Median refuge islands provide added comfort and should be angled to direct users to face oncoming traffic
Rectangular Rapid Flash Beacons (RRFB) dramatically increase compliance over conventional warning beacons.
W11-15, W16-7P
Yield line with R1-5 at yield location.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NDOT. Process for the Evaluation of Uncontrolled Crosswalk Locations. 2014.

Cost

- Actuated Pedestrian Crossing: $40,000 each
- Marked Crosswalk, $550 each
- Signage: $125 each
- Median Refuge Island (optional): $8,500 - $33,000 each

SHARED-USE PATH CROSSINGS

HYBRID BEACONS

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk.

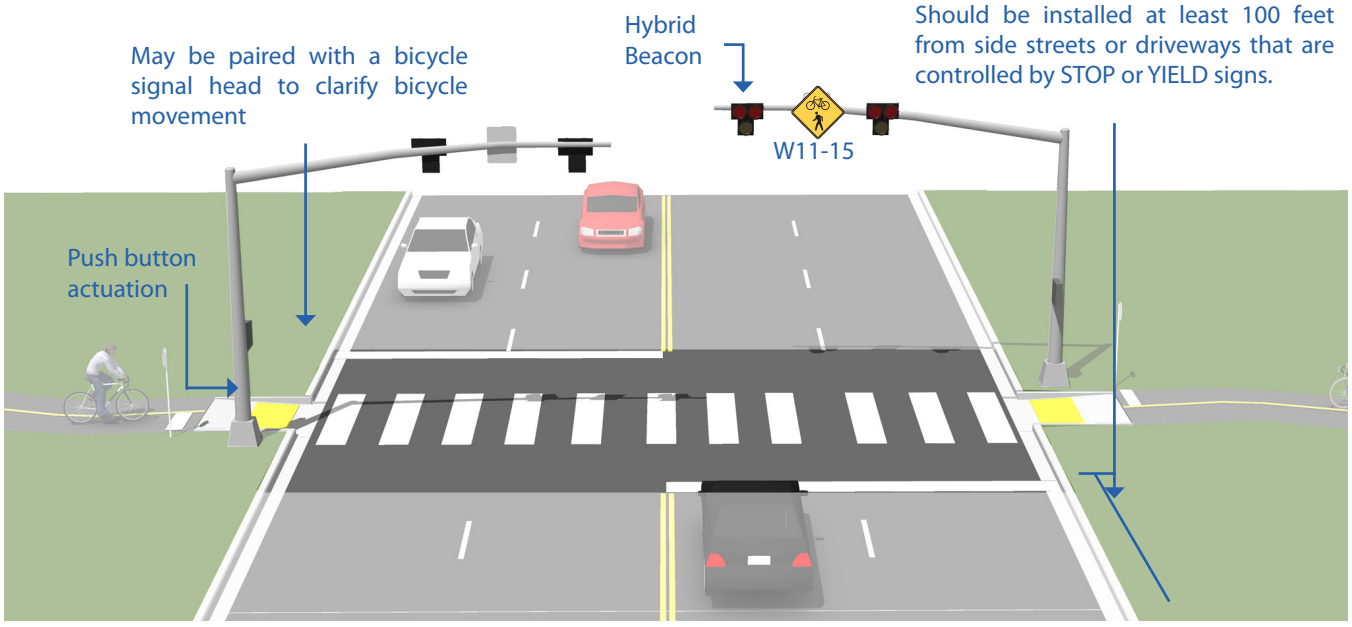
Discussion

Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

This treatment is appropriate for crossings located within school zones.

Design Summary

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.


May be paired with a bicycle signal head to clarify bicycle movement
Hybrid Beacon
Should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs.
W11-15
Push button actuation

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Crossing, Hybrid Beacon $50,000+ each
- Marked Crosswalk, $550 each
- Signage: $125 each

Photo above by Mike Cynecki via PBIC Image Library

SIGNALIZED MID-BLOCK CROSSING

Warrants from the MUTCD combined with sound engineering judgment should be considered when determining the type of traffic control device to be installed at path-roadway intersections. Traffic signals for path-roadway intersections are appropriate under certain circumstances. The MUTCD lists 11 warrants for traffic signals, and although path crossings are not addressed, bicycle traffic on the path may be functionally classified as vehicular traffic and the warrants applied accordingly. Pedestrian volumes can also be used for warrants.

Discussion

Experimental Treatment

A Toucan crossing (derived from: "two can cross") is used in higher traffic areas where pedestrians and bicyclists are crossing together.

This treatment is appropriate for crossings located within school zones.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Design Summary

Warrants

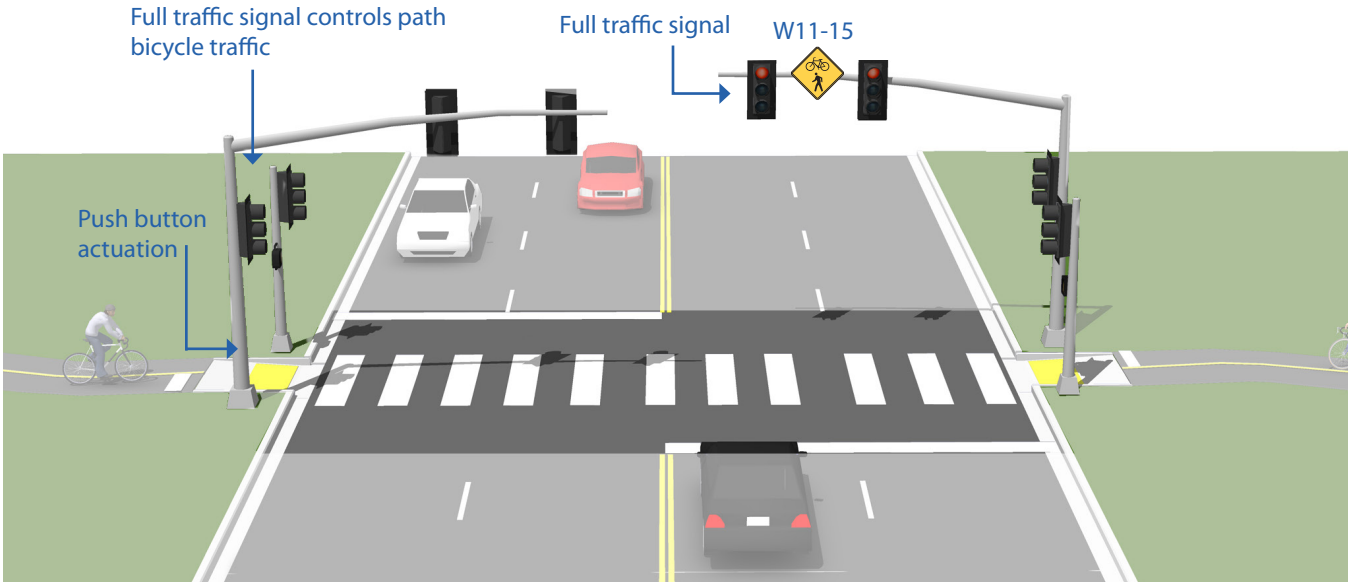
Section 4C.05 in the MUTCD and CAMUTCD describes pedestrian volume minimum requirements (referred to as warrants) for a mid-block pedestrian-actuated signal. Note that California and Nevada have different warrants.

Pavement Markings

Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication.

Cost

- Crossing, Toucan: $90,000 each
- Marked Crosswalk, $550 each
- Signage, $125 each



INTERSECTIONS WITH SMALL STREETS

The California and Nevada Vehicle Code requires that motorists yield right-of-way to pedestrians within crosswalks. This requirement for motorists to yield is not explicitly extended to bicyclists, and the rights and responsibilities for bicyclists within crosswalks is ambiguous. On crossings of minor streets, design solutions should resolve this ambiguity where possible by giving people on bicycles priority within the crossing. Where this is not possible, the design should create conditions and slow speeds that encourage safe interactions in the case of a user error. Determination of priority between streets and paths can be found in the TRB Highway Capacity Manual (2010),

Benefits

Crosswalk markings establish a legal crosswalk at areas away from intersections (MUTCD Section 3B.18).

Motorists decrease speed in the vicinity of marked crosswalks and crosswalk usage increases with the installations of crosswalk markings (Knoblauch, 2001).

Motorists are statistically more likely to yield right-of-way to pedestrians in a marked crosswalk than an unmarked crosswalk (Mitman, 2008).

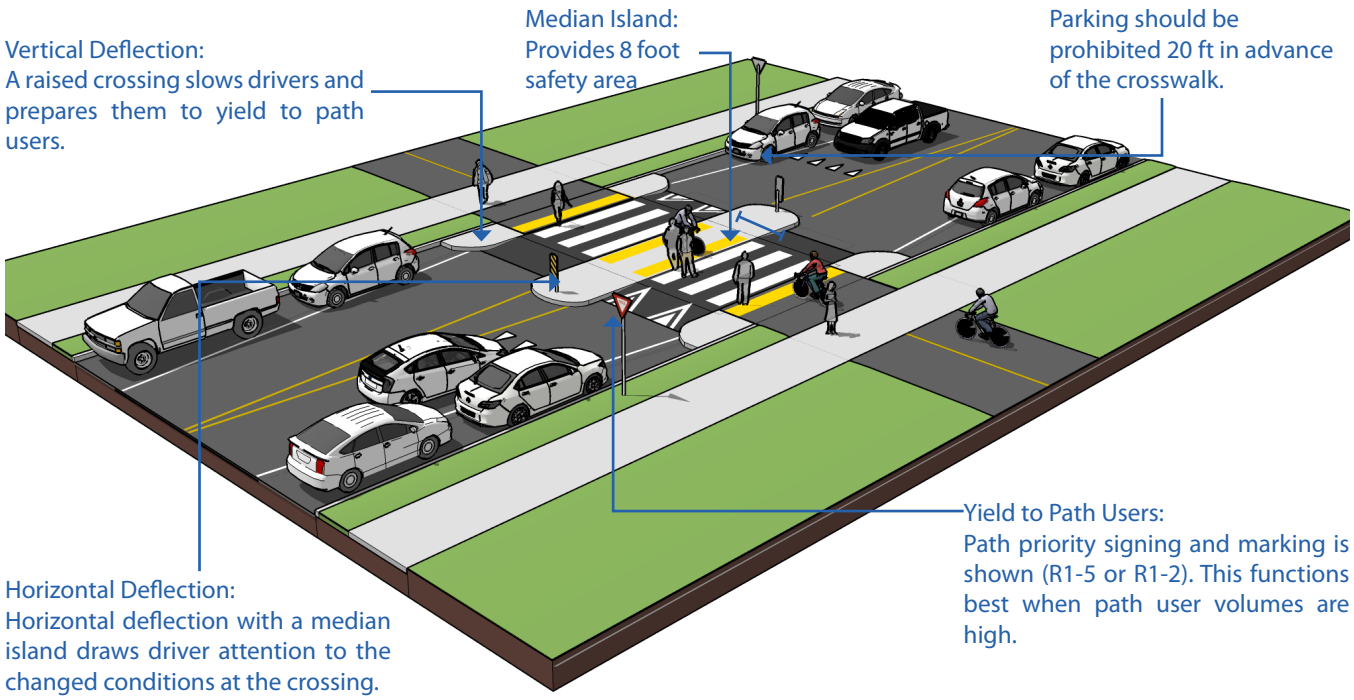
Discussion

Geometric design should promote a high degree of yielding to path users through raised crossings, horizontal deflection, signing, and striping.

The approach to designing path crossings of streets depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

On high speed and high volumes roadways, crosswalk markings alone are not a viable safety measure. This supports the creation of more robust crossing solutions (Zeeger, 2001).

Path Priority Crossing


Vertical Deflection:
A raised crossing slows drivers and prepares them to yield to path users.
Median Island:
Provides 8 foot safety area
Parking should be prohibited 20 ft in advance of the crosswalk.
Horizontal Deflection:
Horizontal deflection with a median island draws driver attention to the changed conditions at the crossing.
Yield to Path Users:
Path priority signing and marking is shown (R1-5 or R1-2). This functions best when path user volumes are high.

Design Summary

Crossing Geometry

In Nevada, parking is prohibited within 20 feet of any marked crosswalk.

A median safety island should allow path users to cross one lane of traffic at a time. The bicycle waiting area should 8 feet wide or wider to allow for a variety of bicycle types.

Raised crossings should raise 4 inches above the roadway with a steep 1:6 (16%) ramp. The raise should use a sinusoidal profile to facilitate snow plow operation. Advisory speed signs may be used to indicate the required slow crossing speed.

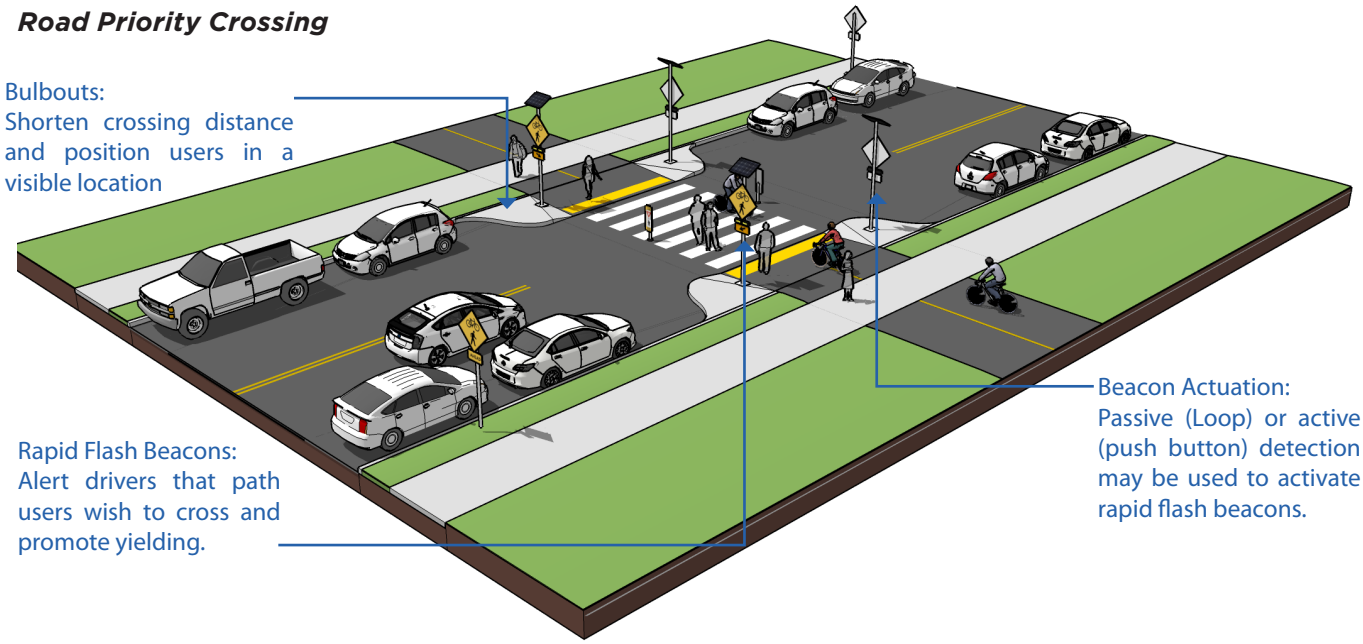
Markings

High-visibility crosswalk markings are the preferred marking type at uncontrolled marked crossings (FHWA, 2013). Transverse lines are "essentially not visible" when viewed from a standard approaching vehicle. (ITE, 2010)

Stop or Yield lines may be used on the roadway 20 ft. in advance of crosswalks when right-of-way priority is given to path users (CA MUTCD 3B.18). A yield line must be paired with a Yield (R1-2) or Yield Here To Pedestrians (R1-5) sign.

In roadway Yield to Pedestrians (R1-6) signs may be used along the centerline point of a crosswalk.

Road Priority Crossing


Bulbouts:
Shorten crossing distance and position users in a visible location
Rapid Flash Beacons:
Alert drivers that path users wish to cross and promote yielding.
Beacon Actuation:
Passive (Loop) or active (push button) detection may be used to activate rapid flash beacons.

References

- Caltrans. California Highway Design Manual (CAHDM). 2015.
- Caltrans. California Manual on Uniform Traffic Control Devices (CAMUTCD). 2014.
- ITE. Pavement Marking Patterns Used at Uncontrolled Pedestrian Crossings. 2010.
- Mitman, M.F., Ragland, D.R., and C.V. Zegeer. The Marked Crosswalk Dilemma: Uncovering Some Missing Links in a 35-Year Debate. 2008.
- Knoblauch, R., M. Nitzburg, and R. Seifert. Pedestrian Crosswalk Case Studies. 2001.
- Zeeger, C., J. Stewart, and H. Huang. Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations. 2001.
- NDOT. Standard Specifications for Road and Bridge Construction. 2014.

Cost

- Striped crosswalks costs range from approximately $100 to 2,100 each.
- Curb extension costs can range from $2,000 to $20,000 depending on the design and site condition.
- Rapid flash beacons costs can range from $15,000 to $60,000 depending on the number of beacons.

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ON-STREET BICYCLE FACILITY DESIGN

ON-STREET BICYCLE FACILITY DESIGN

BICYCLE BOULEVARD

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming, traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

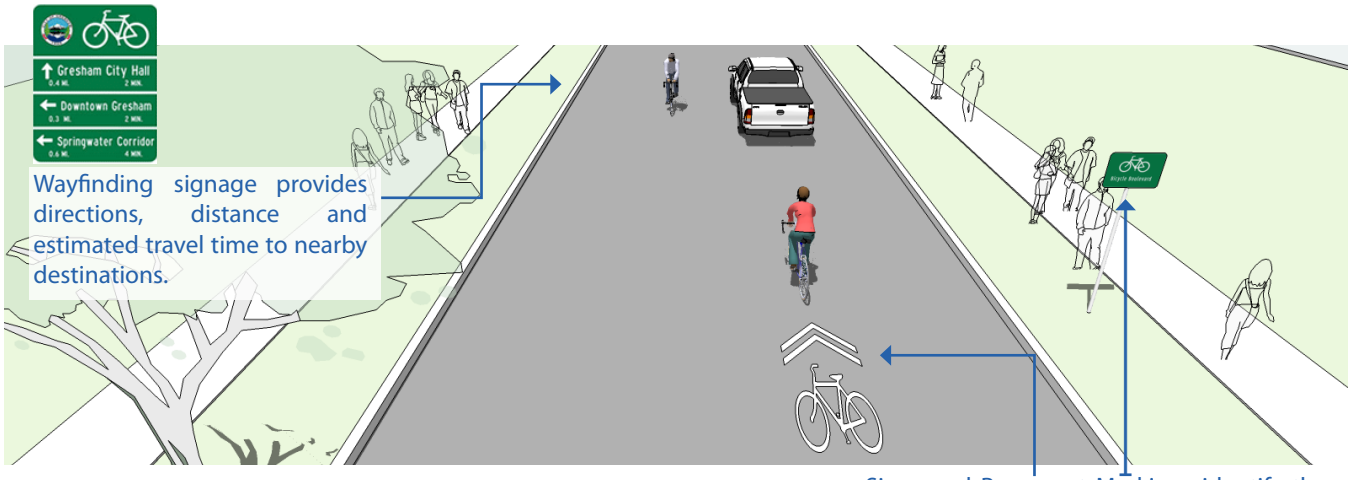
Discussion

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety. Traffic calming can deter motorists from driving on a street, increasing safety for active transportation. Anticipate and monitor vehicle volumes to determine whether traffic calming results in the displacement of traffic volumes to adjacent residential streets. Traffic calming can be implemented on a trial basis.

This treatment is appropriate for school zones.

Design Summary

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 20 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes are under 1,000.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.


Gresham City Hall
Downtown Gresham
Springwater Corridor
Wayfinding signage provides directions, distance and estimated travel time to nearby destinations.
Signs and Pavement Markings identify the street as a bicycle priority route and provide positioning guidance.

References

- Alta Planning + Design and IBPI. Bicycle Boulevard Planning and Design Handbook. 2009.
- FHWA. BikeSafe Bicycle Countermeasure Selection System. 2014.
- NACTO. Urban Bikeway Design Guide. 2012.
- Reid Ewing and Steven Brown. US Traffic Calming Manual. 2009.

Cost

- Bike Boulevard: $1,000-$40,000 per mile (assumes no major renovation is required)
- Bike Boulevard: $150,000-$300,000 (assuming moderate to major roadway renovation)

ON-STREET BICYCLE FACILITY DESIGN

SHOULDER BIKEWAY

Paved shoulders on rural arterials and state highways can offer a functional option to the installation of bicycle lanes when bicycle lanes are not possible. Major intersection designs should still have bicycle pockets (if applicable) and other treatments to make bicycle travel safer and more visible.

Design Summary

Shoulder Width:

Shoulder width should be 4 feet wide minimum (in addition to a gutter pan, if present) to accommodate a shoulder bike route. Shoulder width of at least 5 feet is recommended when a guardrail, curb, or other roadside barrier is present to provide additional shy distance. If a rumble strip is present (such as on a state highway) it is recommended to include a skip (or gap) in the rumble strip to allow bicyclists to cross from the shoulder to the travel lane when encountering debris.

Sign Placement:

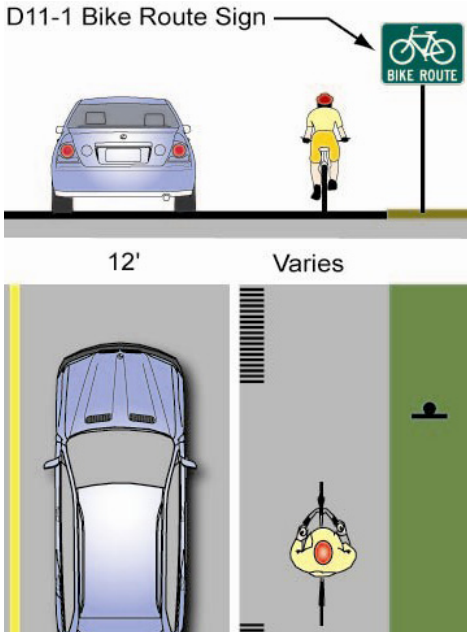
Bicycle Route signage should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

References

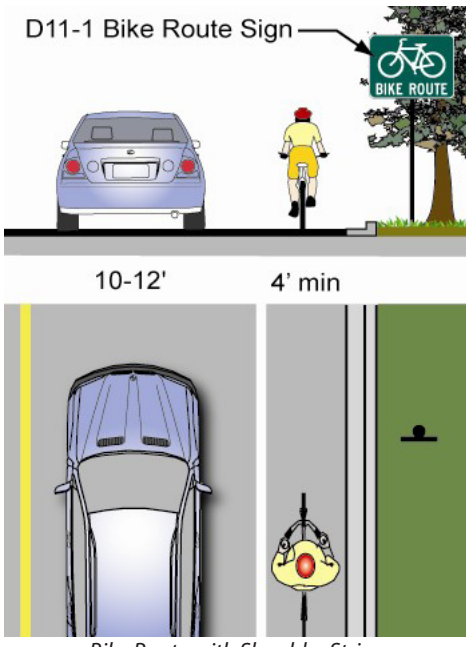
- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bike Route signs with Shoulder Stripe: $5,000 - $10,000 per mile (assumes no major renovation is required)
- Rumble Strip: $0.10 to $0.50 per linear foot



Bike Route with Wide Shoulder and Bicycle Friendly Rumble Strip



Bike Route with Shoulder Stripe

SHARED LANE MARKINGS (SHARROWS)

Shared Lane Markings (also called "Sharrows") are used as an additional treatment for shared roadway facilities. The stencil can serve a number of purposes, such as making motorists aware of the need to share the road with bicyclists, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to avoid "dooring" collisions.

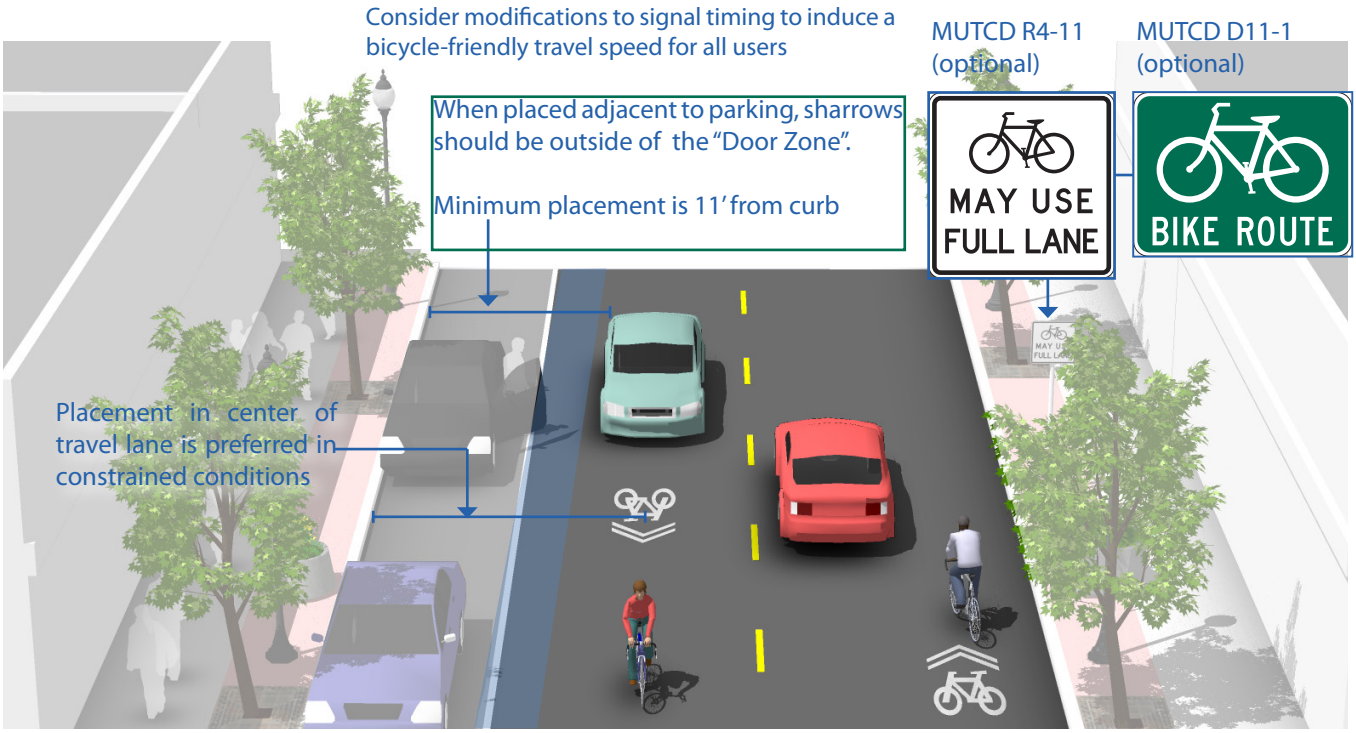
Discussion

Shared lane markings are not appropriate on paved shoulders or in bike lanes, and should not be used on roadways that have a speed limit above 35 mph. Markings should be placed immediately after intersections and spaced at 250 ft intervals thereafter. Though not always possible, placing the markings outside of vehicle tire tracks will increase the life of the markings and the long-term cost of the treatment.

Design Summary

Sign Placement:

Shared Lane Markings pair well with Bikes May Use Full Lane signs.


Consider modifications to signal timing to induce a bicycle-friendly travel speed for all users
MUTCD R4-11 (optional)
MUTCD D11-1 (optional)
When placed adjacent to parking, sharrows should be outside of the "Door Zone".
Minimum placement is 11' from curb
MAY USE FULL LANE
BIKE ROUTE
Placement in center of travel lane is preferred in constrained conditions

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Shared Lane Marking application: $90 each

ON-STREET BICYCLE FACILITY DESIGN

BIKE LANE WITH NO ON-STREET PARKING

Recommended bicycle lane width is 5 feet minimum when adjacent to curb and gutter. Wider bicycle lanes are desirable in certain circumstances such as on higher speed arterials (45 mph+) where a wider bicycle lane can increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Bicycle lanes wider than 7 feet are not recommended.

Design Summary

Bike Lane Width:

4′ minimum when no gutter is present (rural road sections)

5′ minimum when adjacent to curb and gutter (3′ more than the gutter pan width if the gutter pan is greater than 2′)

Recommended Width:

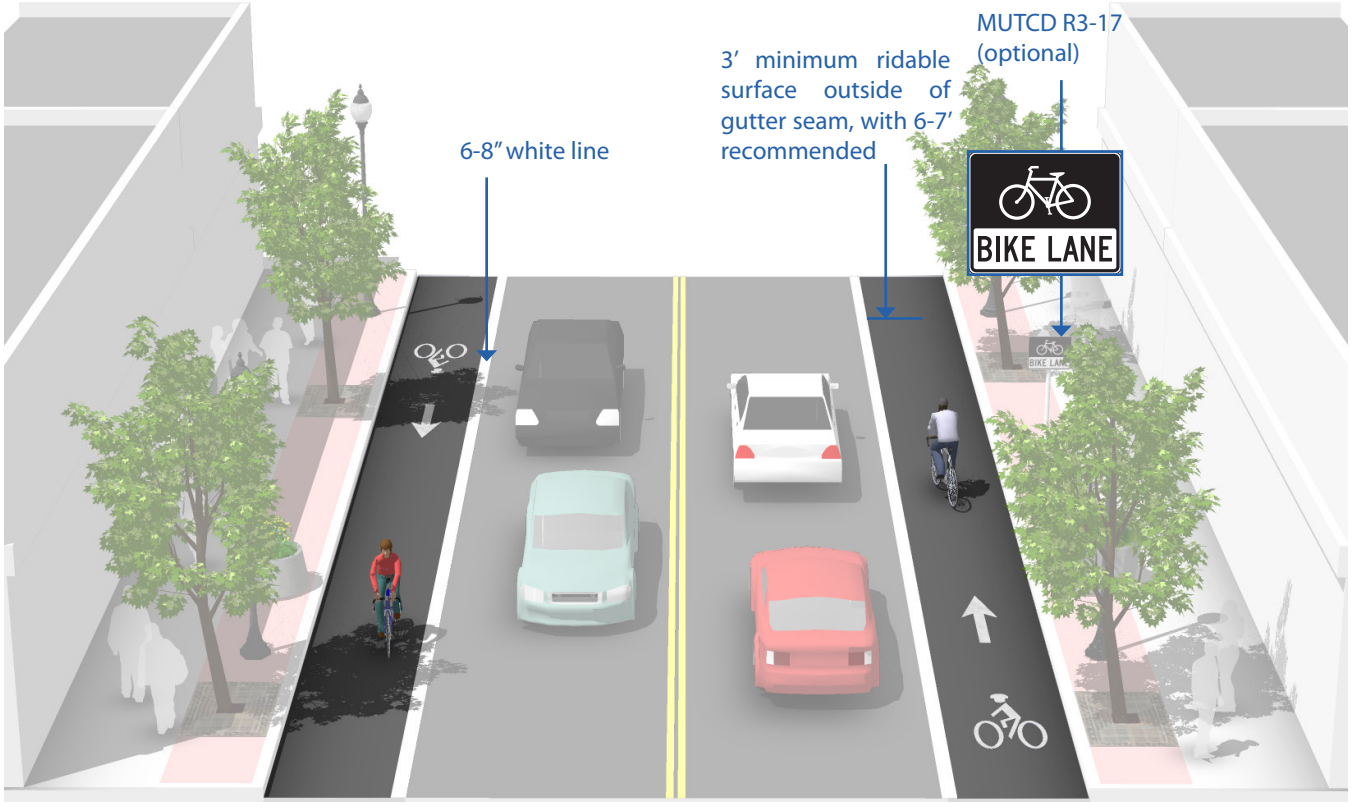
6-7′ where right-of-way allows, in areas of high bicycle use, or on high-speed, high-volume roadways (or with heavy truck volumes) where wider bicycle lanes provide additional lateral separation

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bike Lane: $5,000 - $10,000 per mile



ON-STREET BICYCLE FACILITY DESIGN

BIKE LANE WITH ON-STREET PARALLEL PARKING

Bike lanes adjacent to parallel parking should be designed to be wide enough to allow bicyclists to ride without conflicts with opening car doors.

Design Summary

Bike Lane Width:

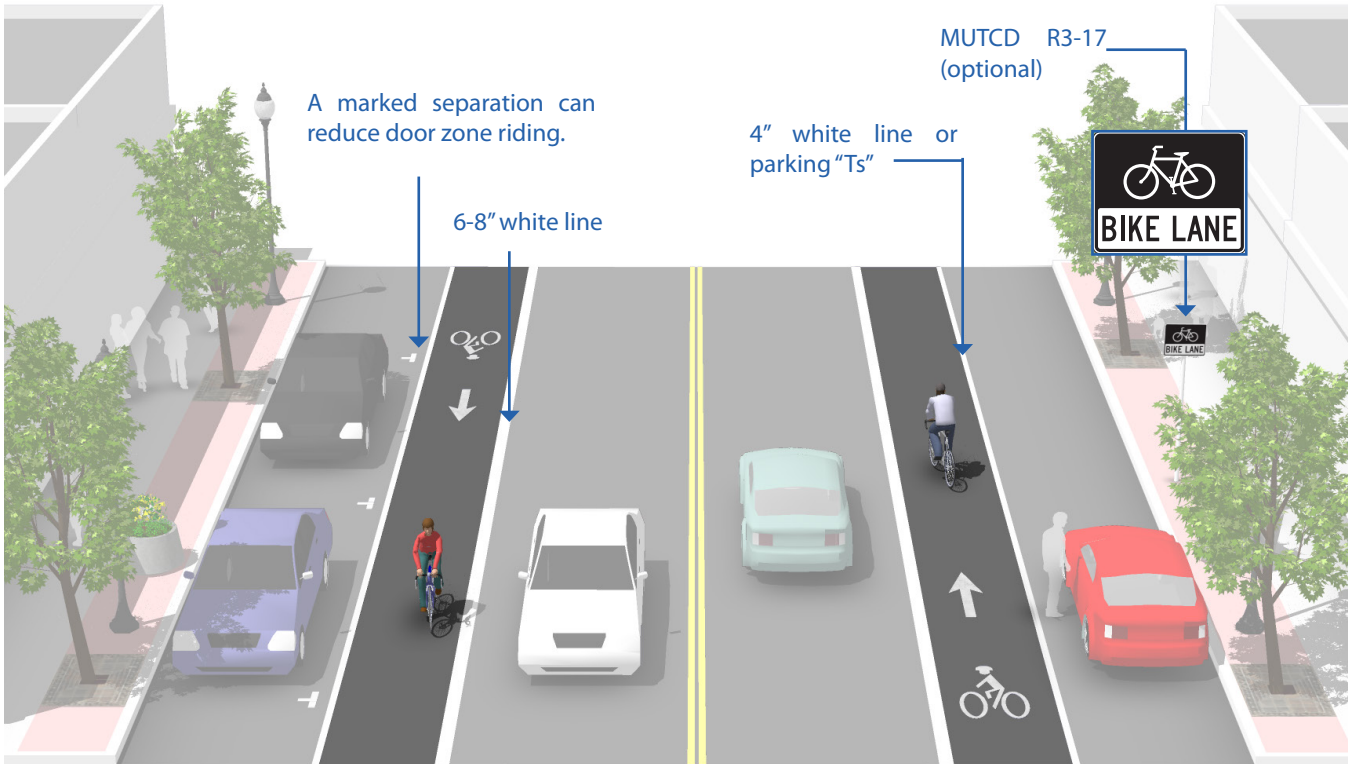
- 6-7 feet recommended to reduce dooring risk in areas with high parking turnover.
- 5 feet minimum recommended when parking stalls are marked
- If wider bike lanes are desired, configure as a buffered bike lane.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bike Lane: $5,000 - $10,000 per mile



ON-STREET BICYCLE FACILITY DESIGN

BUFFERED BIKE LANE

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes are designed to increase the space between the bike lane and the travel lane and/or parked cars. Buffer striping is called Preferential Lane Longitudinal Markings in Section 3D.02 the MUTCD. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

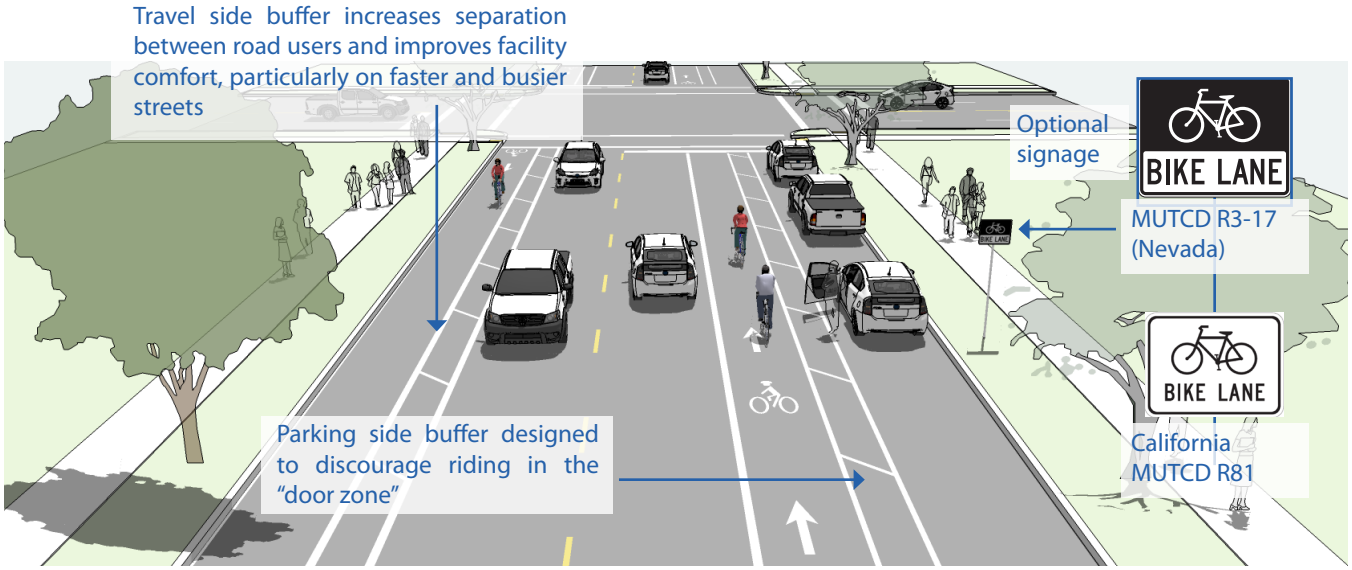
Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

This treatment is appropriate for school zones.

Design Summary

- The minimum bicycle travel area (not including buffer) is 5 feet wide.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dotted line for the inside buffer boundary where cars are expected to cross.


Travel side buffer increases separation between road users and improves facility comfort, particularly on faster and busier streets
Optional signage
BIKE LANE
MUTCD R3-17 (Nevada)
BIKE LANE
California MUTCD R81
Parking side buffer designed to discourage riding in the "door zone"

References

- FHWA. Separated Bike Lane Planning and Design Guide. 2015.
- NACTO. Urban Bikeway Design Guide. 2012.
- Caltrans. MUTCD. 2014.

Cost

- Bike Lane: $5,000 - $10,000 per mile

ON-STREET BICYCLE FACILITY DESIGN

SEPARATED BIKEWAY (CYCLE TRACK)

Separated bikeways, also known as cycle tracks or protected bike lanes, are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of a conventional bike lane. They are physically separated from motor traffic and distinct from the sidewalk. Separated bikeways have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used by bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. Raised bike lanes may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the bike lane from the pedestrian space.

Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to separated bike lane design. Parking should be prohibited within 30 feet of the intersection to improve visibility. Color, yield markings and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the bike lane has priority over entering and exiting traffic.

Protection is provided through physical barriers and can include bollards, parking, a planter strip, an extruded curb, or on-street parking. Bike lanes using these protection elements typically share the same elevation as adjacent travel lanes. Raised cycle tracks may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the facility from the pedestrian area. **This treatment is appropriate for school zones.**

Design Summary

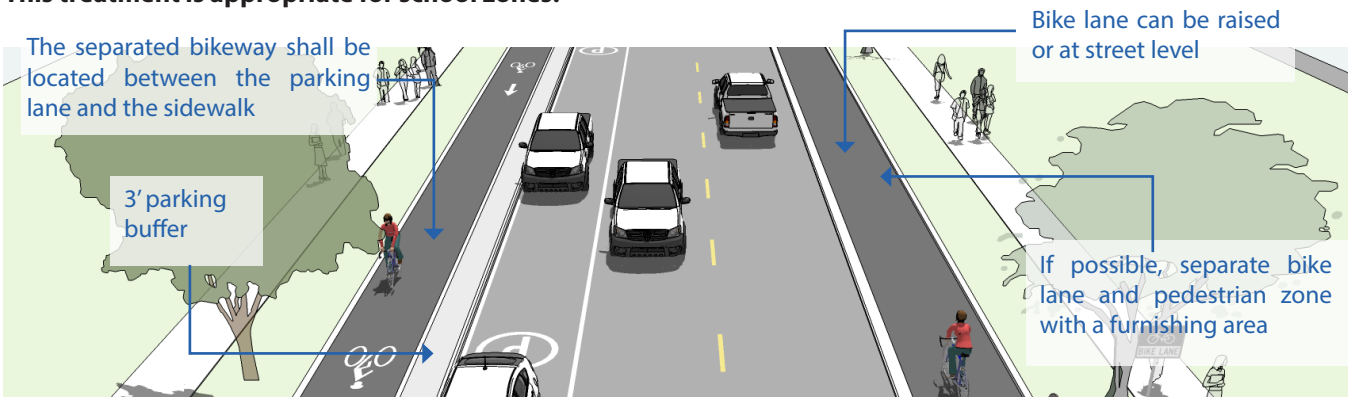
Separated bikeways should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.

One-Way Separated Bike Lanes

- 7 foot recommended minimum to allow passing. 5 foot minimum width in constrained locations.

Two-Way Separated Bike Lanes

- Separated bike lanes located on one-way streets have fewer potential conflict areas than those on two-way streets.
- 12 foot recommended minimum for two-way facility. 8 foot minimum in constrained locations


The separated bikeway shall be located between the parking lane and the sidewalk
3' parking buffer
Bike lane can be raised or at street level
If possible, separate bike lane and pedestrian zone with a furnishing area

References

- NACTO. Urban Bikeway Design Guide. 2012.
- FHWA. Separated Bike Lane Planning and Design Guide. 2015.

Cost

- Cost varies depending on design and site conditions.

ON-STREET BICYCLE FACILITY DESIGN

ADVISORY BIKE LANE

Advisory bicycle lanes (also called dashed bicycle lanes) provide a bicycle-priority space on a two-lane street too narrow for conventional bicycle lanes. Similar in appearance to bicycle lanes, advisory bicycle lanes are distinct in that they are temporarily shared with motor vehicles during head-on approaching maneuvers and turning movements. They are most appropriate on streets where there is no centerline, or on wide and rural residential streets.

Discussion

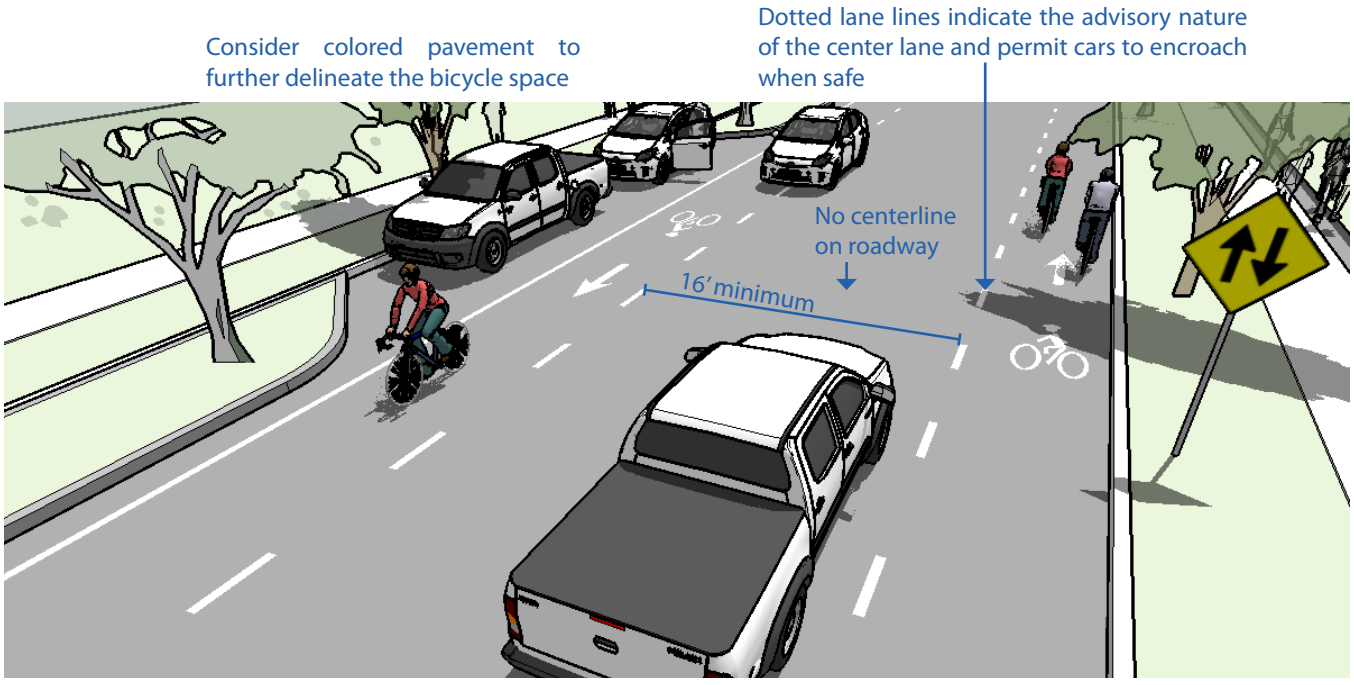
This treatment is considered experimental by FHWA and may require a *Request to Experiment* as described in section 1A.10 of the MUTCD. Specific design detail should conform to MUTCD and Ca-TCDC experimentation requirements.

Consider the use of colored pavement within the advisory bicycle lane area to discourage unnecessary encroachment by motorists or parked vehicles.

Design Summary

Advisory bike lanes should have the following characteristics:

- Motor vehicle traffic is <4000 motor vehicles per day (<2000 preferred).
- Advisory bike lane width of 5 to 7 ft.
- Recommended two-way motor vehicle travel lane width of 16 ft. Some installations have worked with center lane as narrow as 10 ft.


Consider colored pavement to further delineate the bicycle space
Dotted lane lines indicate the advisory nature of the center lane and permit cars to encroach when safe
No centerline on roadway
16' minimum

References

- City of Minneapolis. Request To Experiment. 2010.

Cost

- Bike Lane: $5,000-$10,000 per mile

ADDITIONAL BIKE ROUTE SIGNAGE

Signs may be used to raise awareness of the presence of bikes on the roadway beyond that of the conventional "Bike Route" sign. These signs are intended to reduce motor vehicle/bicyclist conflict and are appropriate to be placed on routes that lack paved shoulders or other bicycle facilities.

Discussion

In higher speed rural contexts, a bicycle warning sign (W11-1) paired with a legend plaque reading "ON ROADWAY" may clarify to motor vehicle drivers to expect bicyclists.

In more developed areas, "Bikes May Use Full Lane" (BMUFL) (R4-11) signs encourages bicyclists to take the lane when the lane is too narrow. They typically work best when placed near activity centers such as schools, shopping centers and other destinations that attract bicycle traffic.

A study by researchers at North Carolina State University concluded that the BMUFL sign achieves greater clarity of understanding than the "Share the Road" (W16-1P) plaque often used in similar situations.

Study responses indicated a lack of awareness of the meaning of the Share the Road plaque. Due to this lack of public understanding and lack of support by local bicycle groups, at least one state DOT has discontinued use of the Share The Road plaque. (DelDOT, Memorandum: Bicycle Warning Sign and Share the Road Plaque. November 2013)

Dedicated bicycle facilities are recommended for roadways with speed limits above 35 mph where the need for bicycle access exists.

W11-1 with custom "ON ROADWAY" legend plaque. Under MUTCD 2C.03 P04, a state or local road agency is permitted to use word messages on warning signs other than those shown in the MUTCD.

R4-11

Design Summary

- Use with travel lanes less than 14 feet wide, which are too narrow for safe passing within the lane.
- Signs should be placed at regular intervals along routes with no designated bicycle facilities.

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- Hess G, Peterson MN (2015) "Bicycles May Use Full Lane" Signage Communicates U.S. Roadway Rules and Increases Perception of Safety.

Cost

- Sign, regulation: $150 each

MANHOLES AND DRAINAGE GATES

Utility infrastructure within the roadway can present significant hazards to bicyclists. Manholes, water valve covers, drain inlets and other obstructions can present an abrupt change in level, or present a situation where the bicyclist's tire could become stuck, potentially causing a collision. Every effort should be made to avoid placing these hazards within the likely travel path of bicyclists on new roadway construction.

Discussion

For existing roadways, the roadway surface can be ground down around the manhole or drainage grate to be no more than half an inch of vertical drop. When roadways undergo overlays, this step is often omitted and significant elevation differences can result in hazardous conditions for bicyclists.

Bicycle drainage grates should not have longitudinal slats that can catch a bicycle tire and potentially cause a crash. Acceptable grate designs are presented (top right) as A: patterned, B: transverse grate, or C: modified longitudinal with no more than 6" between transverse supports). Type C is the least desirable as it could still cause problems with some bicycle tires.

The drop in-inlet shown to the right avoids all issues with grates in the bicyclists' line of travel. However, these drainage inlets are less efficient than grate inlets, and therefore require installing more closely spaced inlets, much longer inlets and perhaps supplemental means of capturing runoff. For this reason TRPA does not recommend replacing existing grate inlets with drop-in inlets, and suggests agencies weigh the additional costs of drop-in inlets in new construction with the possible benefits.

The MUTCD recommends providing a diagonal solid white line for hazards or obstructions in bikeways (see right).

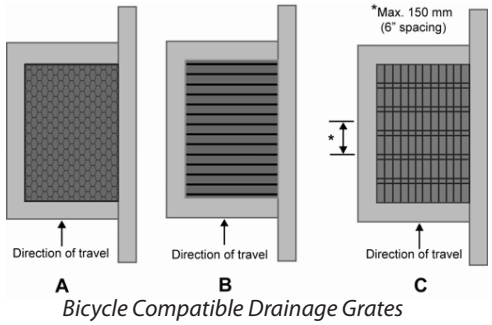
References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- NDOT Standard Plans for Road and Bridge Construction.
- NDOT Standard Specifications for Road and Bridge Construction.

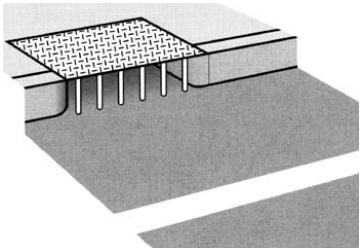
Design Summary

Placement:

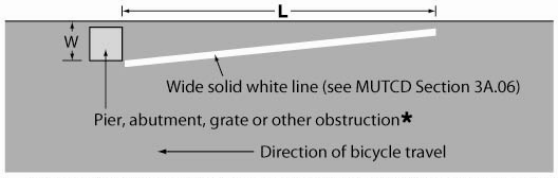
Manholes should be placed outside of any bike lanes. Drainage grates should be of one of the types below.



Bicycle Compatible Drainage Grates



Drop-in inlet flush with in the curb face (Oregon DOT)
(Not approved for use on California Highways)



L = WS, where W is the offset in feet and S is bicycle approach speed in mph

★ Provide an additional foot of offset for a raised obstruction and use the formula L= (W+1) S for the taper length

Figure 9C-8B (National MUTCD)

Cost

- Striping: $2 per linear foot
- Drainage grate: $500

BICYCLE ACCESS DURING CONSTRUCTION ACTIVITIES

When construction impedes a bicycle facility, the provision for bicycle access shall be developed during the construction project planning. Long detour routing should be avoided because of lack of compliance. Where there is no detour, provide for passage of bicyclists through or adjacent to the construction area, with signage or other indication of where cyclists should go.

Discussion

Advance warning of the detour should be placed at appropriate locations and clear wayfinding should be implemented to enable bicyclists to continue safe operation along travel corridor. Traffic control signs should not be placed within bike lanes or road shoulders.

Design Summary

Construction Detour Signs:

Detours should be adequately marked with standard temporary route and destination signs (M409a and M4-9c).

The Pedestrian/Bicycle Detour sign should have an arrow pointing in the appropriate direction.

National MUTCD

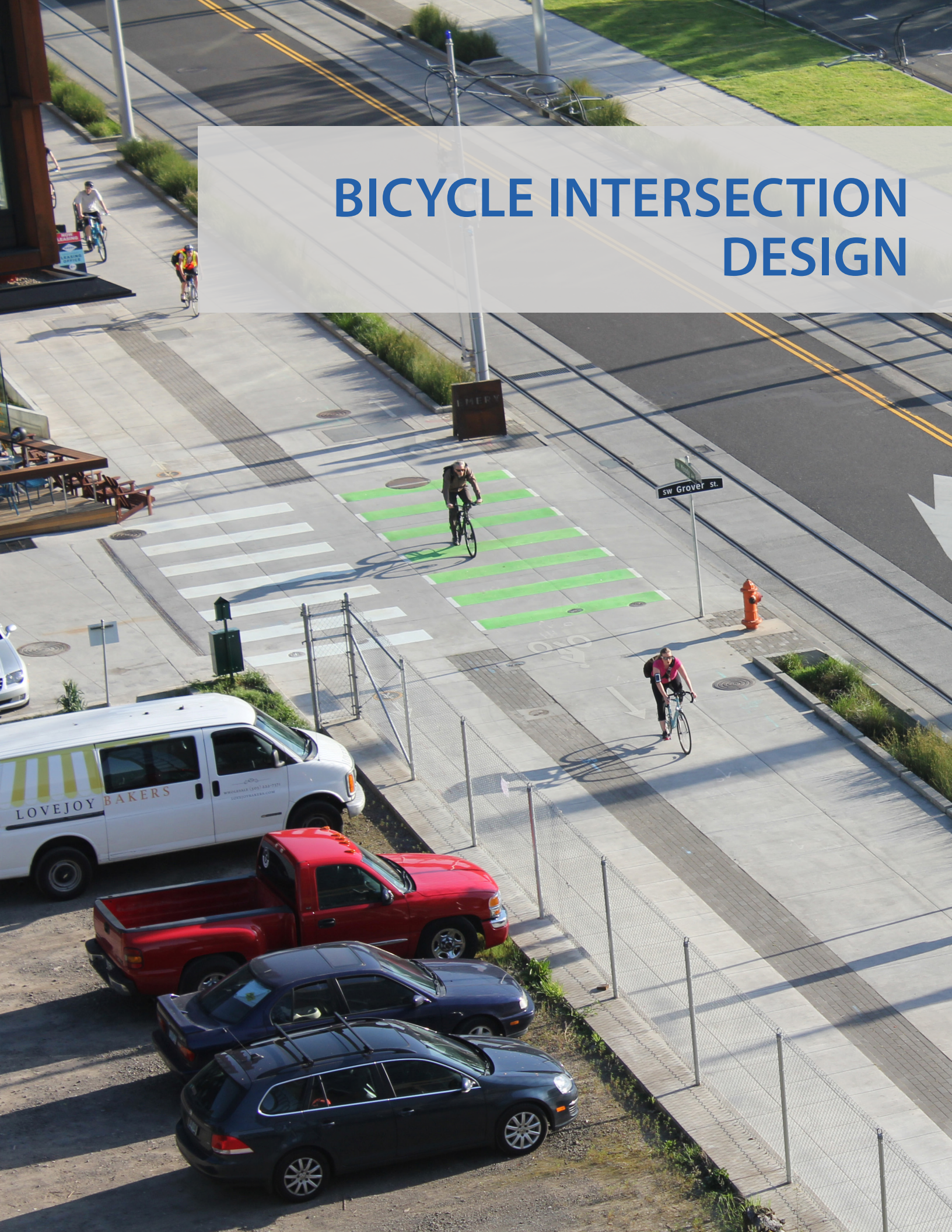
References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.

Cost

- Sign, regulation: $150 each

BICYCLE INTERSECTION DESIGN



BICYCLE DETECTION AT SIGNALIZED INTERSECTIONS

Proper bicycle detection should meet two primary criteria: 1) accurately detects bicyclists and 2) provides clear guidance to bicyclists on how to actuate detection (e.g., what button to push, where to stand). Bicycle loops and other detection mechanisms can also provide bicyclists with an extended green time before the main signal turns green.

Discussion

Push Button Actuation

User-activated button mounted on a pole facing the street.

Loop Detectors

Bicycle-activated loop detectors are installed within the roadway to allow the presence of a bicycle to trigger a change in the traffic signal. This allows the bicyclist to stay within the lane of travel without having to maneuver to the side of the road to trigger a push button.

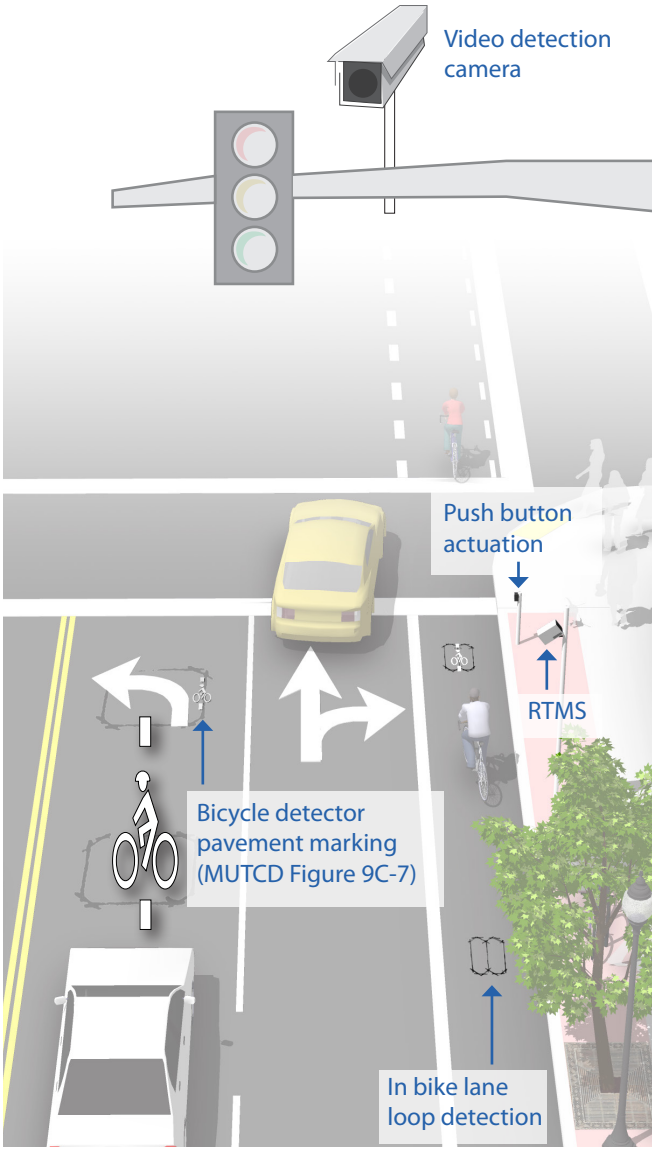
Loops that are sensitive enough to detect bicycles should be supplemented with pavement markings to instruct bicyclists how to trip them.

Video Detection Cameras

Video detection systems use digital image processing to detect a change in the image at a location. These systems can be calibrated to detect bicycles. Video camera system costs range from $20,000 to $25,000 per intersection.

Remote Traffic Microwave Sensor Detection (RTMS)

RTMS is a system which uses frequency modulated continuous wave radio signals to detect objects in the roadway. This method marks the detected object with a time code to determine its distance from the sensor. The RTMS system is unaffected by temperature and lighting, which can affect standard video detection.



References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Bicycle Loop Detector: $1,000-$2,500 each

LOOP DETECTOR PAVEMENT MARKINGS AND SIGNAGE

Bicycle Detector Pavement Markings guide bicyclists to position themselves at an intersection to trigger signal actuation. The CA MUTCD has a different recommended configuration for these pavement markings that the National MUTCD. Frequently these pavement markings are accompanied by signage that can provide additional guidance (see below).

Design Summary

Locate Bicycle Detector Pavement Marking over center of quadrupole loop detector if in bike lane, or where bicycle can be detected in a shared lane by loop detector or other detection technology.

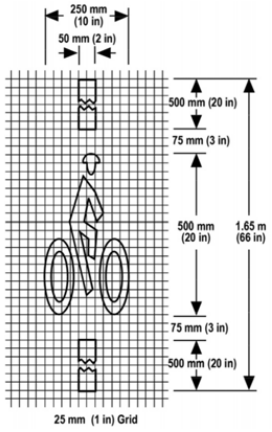


Figure 9C-7 - CAMUTCD

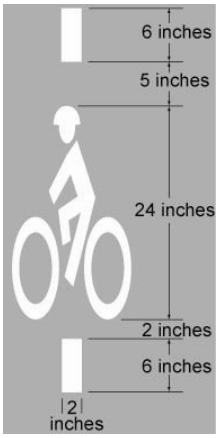


Figure 9C-7 - National MUTCD

Accompanying Signage (R10-22)

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- Caltrans. Standard Plans ES-5B. 2010.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Cost

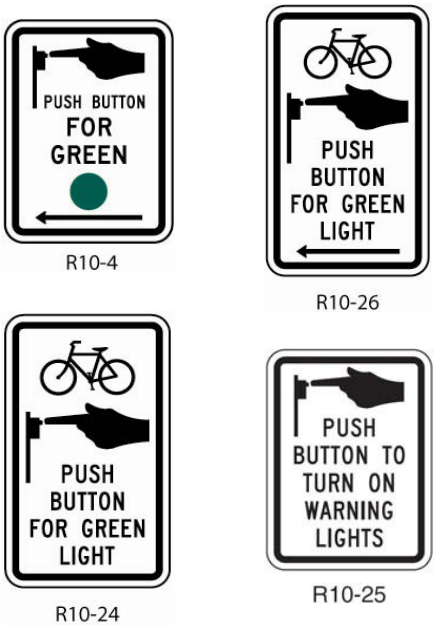
- Bicycle -> Loop -> Detector, -> Install -> stencils: -> $100per intersection leg

BICYCLE PUSH BUTTONS

Bicycle push buttons can also provide signal actuation and timing adjustments for bicyclists. Push buttons are recommended for use with shared-use paths or other unique interactions with bicycle facilities. Push buttons are generally unsuitable for conventional bike lane situations as the bicyclist would have to leave the roadway to activate the signal. An acceptable situation exists where a push button can be located closer to the bike lane if no vehicle right turn lane is present so that the bicyclist does not have to dismount to reach the signal.

Design Summary

- Bicycle push buttons may be used where a push button detector has been installed exclusively to activate a green phase for bicyclists.
- The R10-4, R10-24, R10-25, R10-26 and R62C signs should be installed near the edge of the sidewalk, in the vicinity of where bicyclists will be crossing the street.



2009 National MUTCD

R62C (California Only) sign

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Cost

- Push Button: $600-$1,390 each

BICYCLE SIGNAL PHASE

Protected bicycle lane crossings of signalized intersections can be accomplished through the use of a bicycle signal phase which reduces conflicts with motor vehicles by separating bicycle movements from any conflicting motor vehicle movements. Bicycle signals are traditional three lens signal heads with green, yellow and red bicycle stenciled lenses.

Discussion

A bicycle signal should be considered for use only when the volume/collision or volume/geometric warrants have been met. (CAMUTCD 4C.102)

FHWA has approved bicycle signals for use, if they comply with requirements from Interim Approval 16 (I.A. 16).

Bicyclists typically need more time to travel through an intersection than motor vehicles. Green light times should be determined using the bicycle crossing time for standing bicycles.

Design Summary

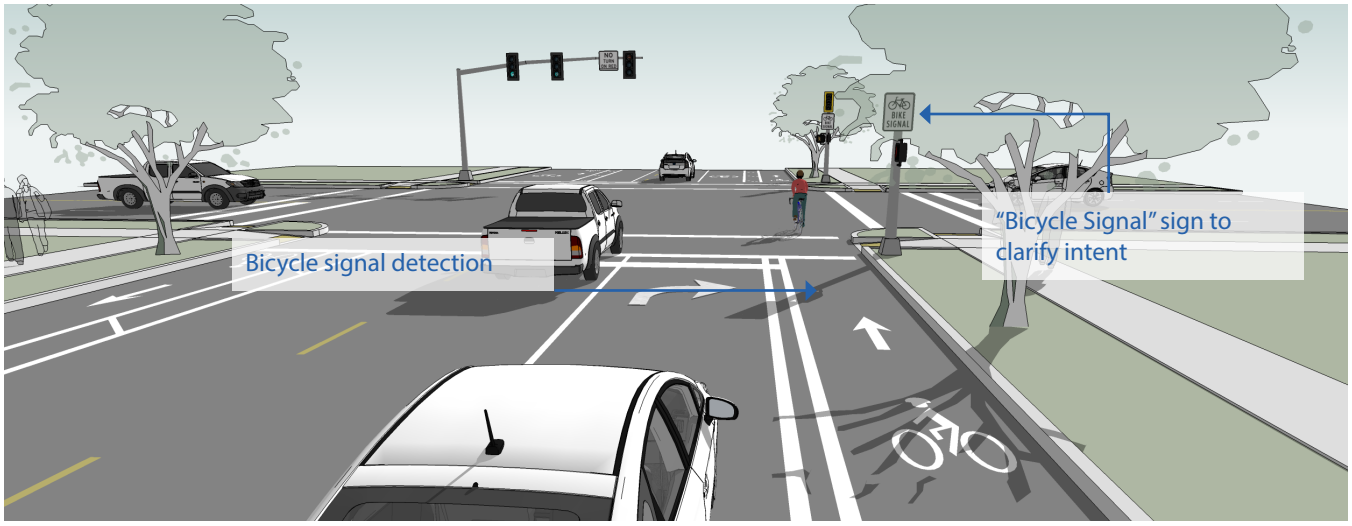
Application:

Bicyclists moving on a green or yellow signal indication in a bicycle signal shall not be in conflict with any simultaneous motor vehicle movement at the signalized location

Design:

An additional "Bicycle Signal" sign should be installed below the bicycle signal head.

Designs for bicycles at signalized crossings should allow bicyclists to trigger signals and safely maneuver the crossing.



References

- FHWA. Interim Approval for Optional Use of a Bicycle Signal Face (IA-16). 2013.

Cost

- Bicycle signal heads have an average cost of $12,800.
- Video detection camera system costs range from $20,000 to $25,000 per intersection.

BICYCLE INTERSECTION DESIGN

BIKE BOX

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

Discussion

Bike boxes are considered experimental by the FHWA. They should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly. Prohibiting right turns on red improves safety for bicyclists yet does not significantly impede motor vehicle travel.

References

- NACTO. Urban Bikeway Design Guide. 2012.

Application of green pavement coloring addressed in:

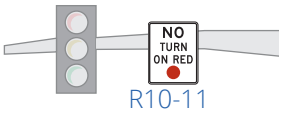
- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

Design Summary

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.



R10-11

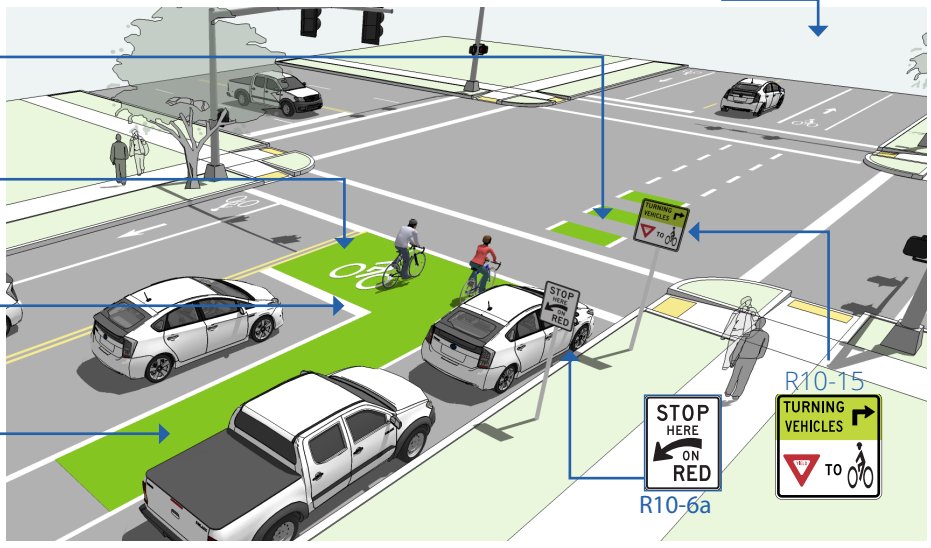
No Turn on Red restriction for motorists

May be combined with intersection crossing markings and colored bike lanes in conflict areas

Colored pavement can be used in the box for increased visibility

Wide stop lines used for increased visibility

If used, colored pavement should extend 50' from the intersection



R10-15

R10-6a

TWO-STAGE LEFT TURN BOX

Two-stage turn boxes offer bicyclists a safe way to make turns at multi-lane signalized intersections from a separated or conventional bike lane, as an alternative to making a vehicular left turn by "taking the lane". On high-speed, high-volume streets, bicyclists are often unable to merge into traffic to turn making the provision of two-stage left turn boxes critical. Design guidance for two-stage turns apply to both conventional and separated bike lanes.

Discussion

Two-Stage turn boxes are considered experimental by FHWA. While two stage turns may increase bicyclist comfort in many locations, this configuration will typically result in higher average signal delay for bicyclists due to the need to receive two separate green signal indications (one for the through street, followed by one for the cross street) before proceeding.

References

- NACTO. Urban Bikeway Design Guide. 2012.

Application of green pavement coloring addressed in:

- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

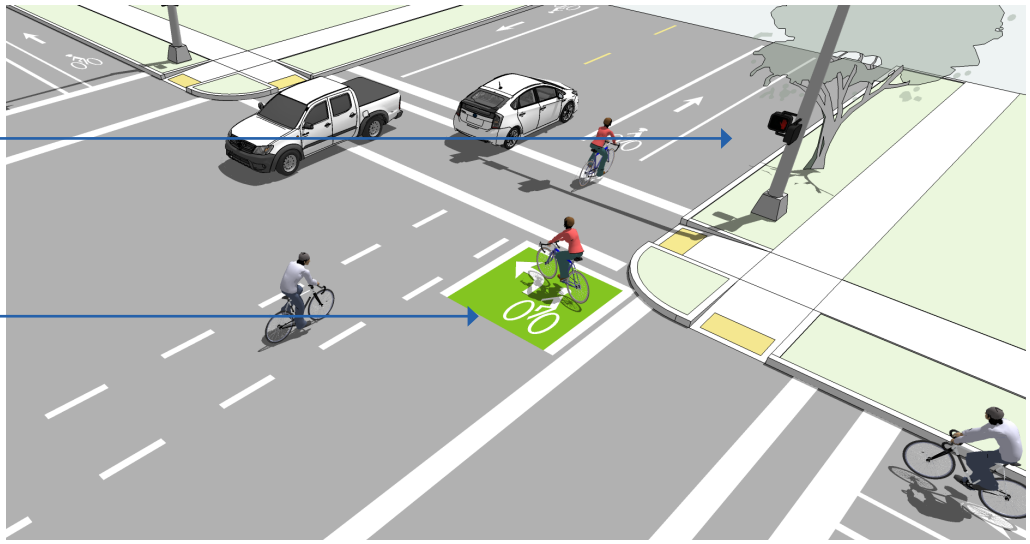
Design Summary

- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or separated bike lane buffer area.
- 6' minimum depth of bicycle storage area
- Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed on the cross street to prevent vehicles from entering the turn box.

Turns from cycle tracks may be protected by a parking lane or other physical buffer

Turns from a bicycle lane may be protected by an adjacent parking lane or crosswalk setback space.

Consider using colored pavement inside the box to further define the bicycle space



BIKE LANE AT INTERSECTION WITH RIGHT TURN ONLY LANE

The appropriate treatment at right turn only lanes is to introduce an added turn lane to the outside of the bicycle lane. The area where people driving must weave across the bicycle lane should be marked with dotted lines and dotted green pavement to identify the potential conflict areas. Signage should indicate that motorists must yield to bicyclists through the conflict area.

Discussion

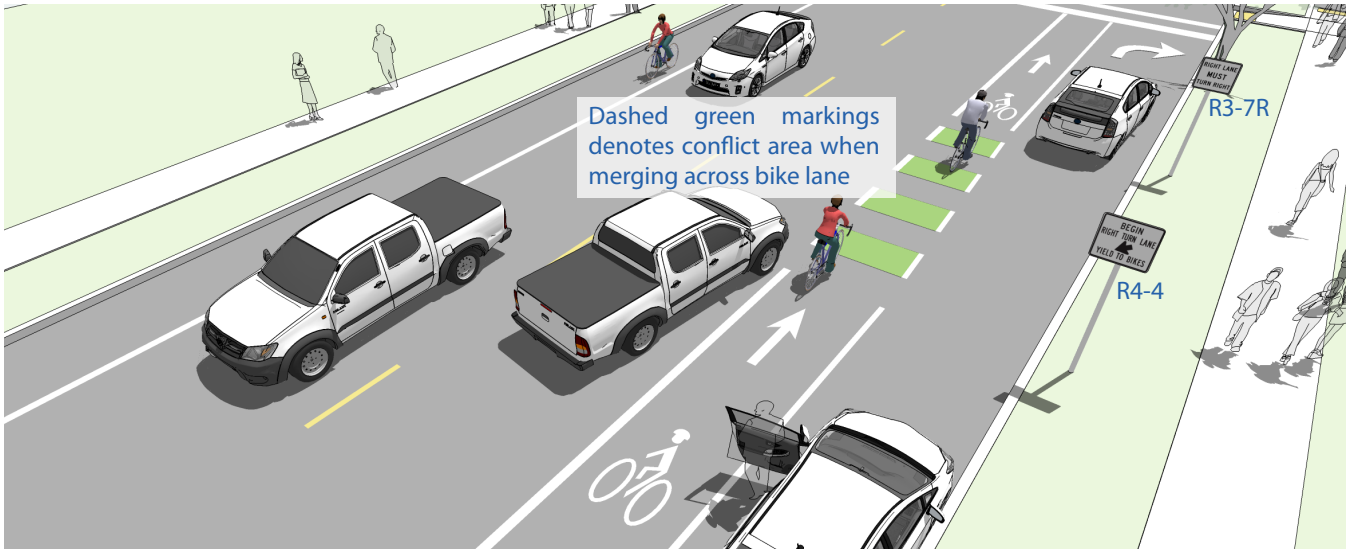
Maintaining a straight bicycle path reinforces the priority of bicyclists over turning cars. Drivers must yield to bicyclists before crossing the bike lane to enter the turn only lane.

The use of dual right-turn-only lanes should be avoided on streets with bike lanes (AASHTO, 2012). Where there are dual right-turn-only lanes, the bike lane should be placed to the left of both right-turn lanes, in the same manner as where there is just one right-turn-only lane.

Design Summary

Design details should emphasis that motorists should yield to bicyclists through the merge area. Travel lane width reductions may be required to achieve this design.

- Mark inside line with 6" stripe.
- Continue existing bike lane width; standard width of 5 to 6 feet (4 feet in constrained locations.)
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored markings in the conflict areas to promote visibility of the dashed weaving area.



References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Application of green pavement coloring addressed in:

- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

COMBINED BIKE LANE/TURN LANE

The combined bike lane/turn lane places shared lane markings within a right turn only lane. A dotted line delineates the space for bicyclists and motorists within the shared lane. Where there isn't room for a conventional bicycle lane and turn lane, a combined bike/turn lane creates a combined lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. This treatment includes markings advising bicyclists of proper positioning within the lane and is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.

Discussion

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less). May not be appropriate for high-speed arterials or intersections with long right turn lanes.

References

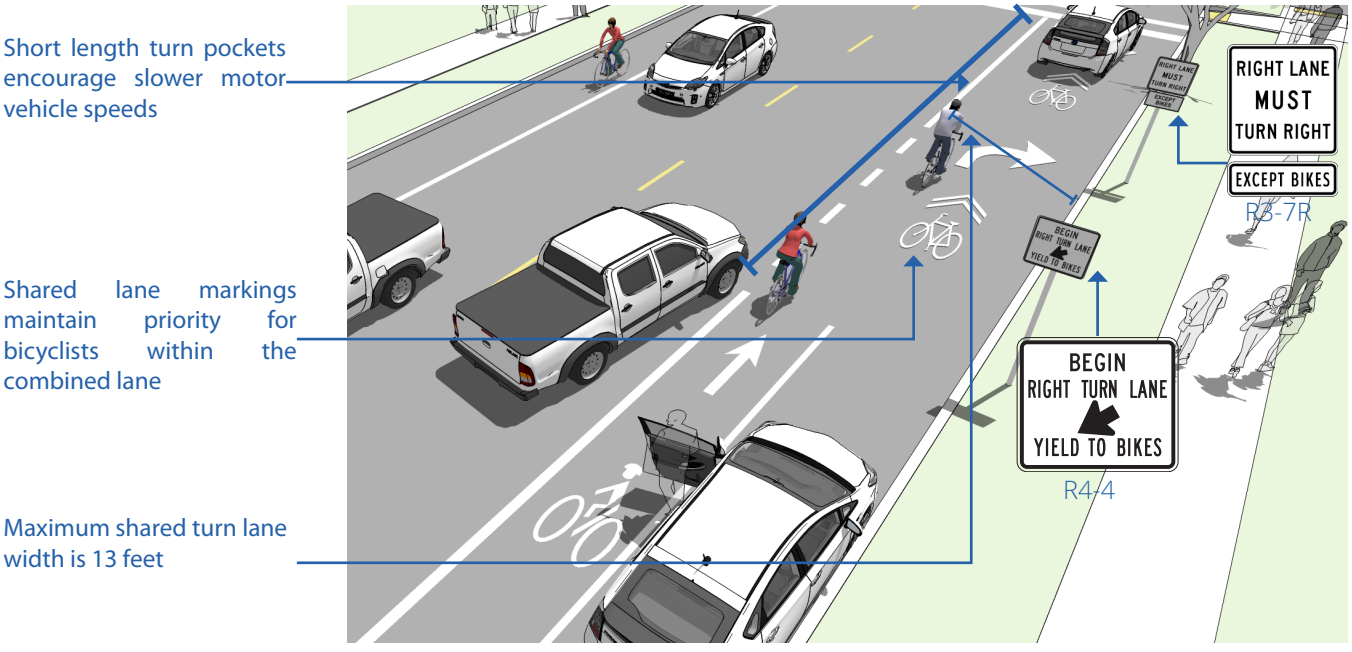
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Cost varies depending on design and site conditions.

Design Summary

- Maximum shared turn lane width is 13 feet; narrower is preferable.
- Shared lane markings maintain bicycle priority and indicate preferred positioning of bicyclists within the combined turn lane.
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- An R3-7R "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.


Short length turn pockets encourage slower motor vehicle speeds
Shared lane markings maintain priority for bicyclists within the combined lane
Maximum shared turn lane width is 13 feet
RIGHT LANE MUST TURN RIGHT
EXCEPT BIKES
R3-7R
BEGIN RIGHT TURN LANE YIELD TO BIKES
R4-4

INTERSECTION DESIGN

BIKE LANE AT DROP LANE

When a through lane transitions directly into a right turn only lane, bicyclists traveling in a curbside bike lane must move laterally to the left of the right turn lane. Designers should provide the opportunity for bicyclists to accept gaps in traffic and control the transition.

Discussion

This treatment is used on streets with curbside bike lanes where a moderate-high speed (≥30 mph) through travel lane transitions into a right turn only lane. Right turn only drop lanes should be avoided where possible.

This treatment functions for skilled riders, but is not appropriate for riders of all ages and abilities. The design should not suggests to bicyclists that they do not need to yield to motorists when moving laterally. This differs from added right turn lanes in important details:

- Do not use a R4-4-YIELD TO BIKES sign
- The bike lane line should not be striped diagonally across the travel lane (with or without colored pavement), as this inappropriately suggests to bicyclists that they do not need to yield to motorists when moving laterally.

Cost

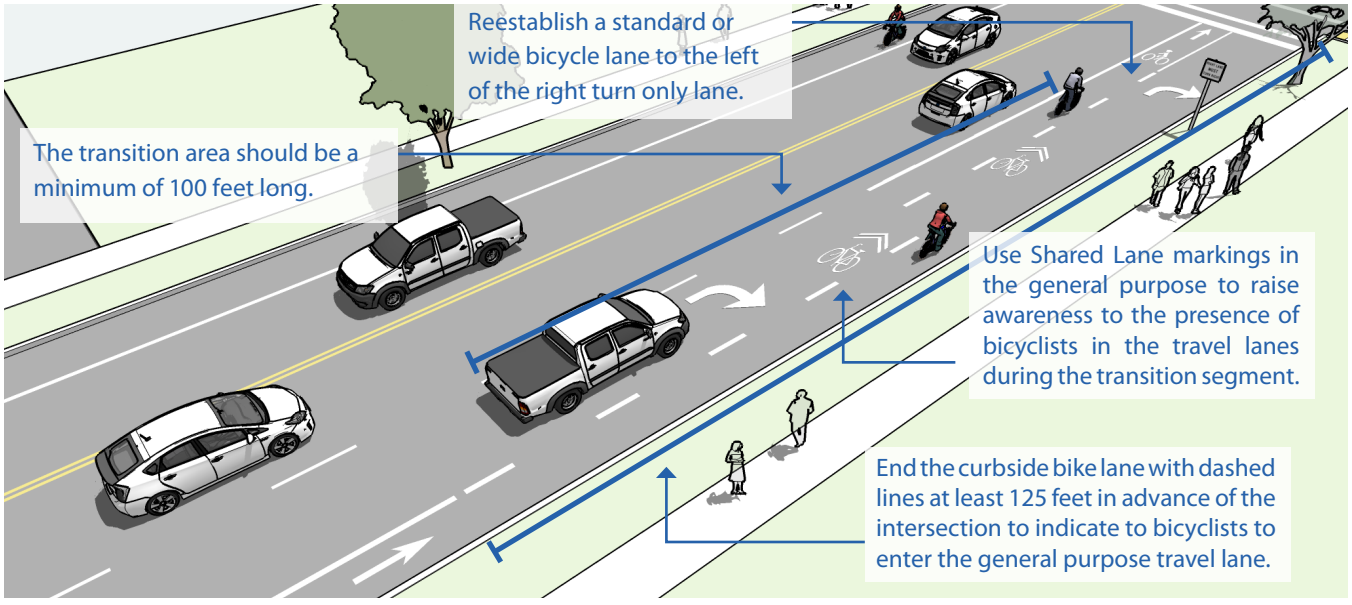
- Cost varies depending on design and site conditions.

Design Summary

- Maximum shared turn lane width is 13 feet; narrower is preferable.
- Shared lane markings maintain bicycle priority and indicate preferred positioning of bicyclists within the combined turn lane.
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- An R3-7R "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.


Reestablish a standard or wide bicycle lane to the left of the right turn only lane.
The transition area should be a minimum of 100 feet long.
Use Shared Lane markings in the general purpose to raise awareness to the presence of bicyclists in the travel lanes during the transition segment.
End the curbside bike lane with dashed lines at least 125 feet in advance of the intersection to indicate to bicyclists to enter the general purpose travel lane.

SEPARATED BIKE LANE INTERSECTION APPROACHES

Separated bike lanes provide additional distance and physical barriers between the bike lane and adjacent travel lane. This separation requires careful design and consideration at intersections to encourage safe interactions.

Discussion

Intersection approach designs depend on available right-of-way, turn lane configuration and bike lane separation distance.

Designs consist of one of the following concepts:

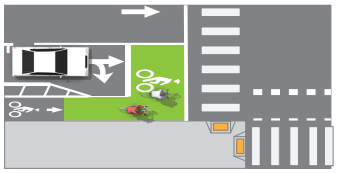
- Exclusive right turn only lanes
- Adjacent shared through/right turn lanes

Signal phasing may have significant impacts on the safety and efficiency of intersections. Where possible, offer protected left-turn signal phases to remove left-hook conflicts. Where right turn volumes are high, consider an exclusive right turn lane and protected right turn signal phase to separate conflicting movements with bicyclists.

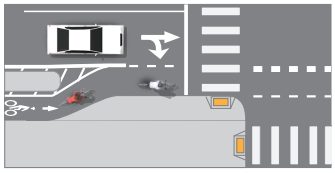
Design Summary

All design approaches use the following principles:

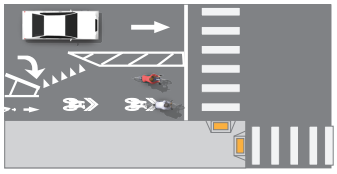
- Increase awareness – Use color, signs and other markings to indicate potential conflict points.
- Raise conspicuity – align the bike lane and remove visual obstruction so that drivers can see bicyclists.
- Isolate conflicts – Focus bicyclists and motor vehicle interactions at specific locations to simplify user expectations.
- Assign priority – In ambiguous situations, clarify who has responsibility to yield.



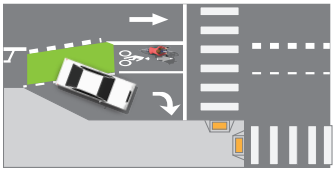
Bike Lane/Bike Box



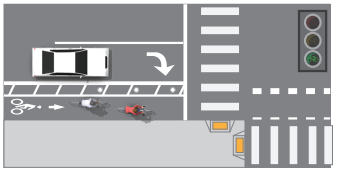
Bend-In



Mixing Zone



Through Bike Lane



Bicycle Signal Phase

References

- NACTO. Urban Bikeway Design Guide. 2012.
- FHWA. Separated Bike Lane Planning and Design Guide. 2015.

Application of green pavement coloring addressed in:

- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

BICYCLE INTERSECTION DESIGN

SINGLE LANE ROUNDABOUTS

In single lane roundabouts it is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

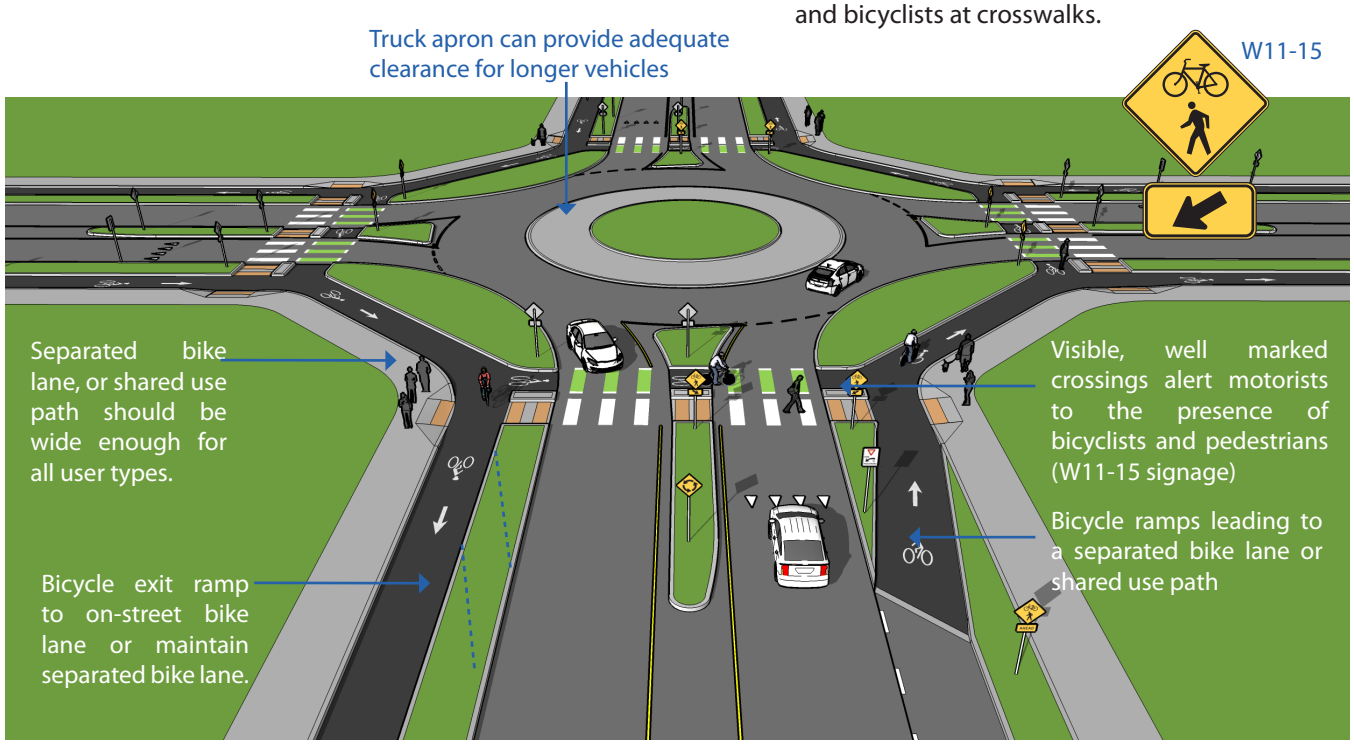
Discussion

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users.

While some bicyclists will operate within the roadway, provide separated facilities for bicyclists who prefer not to navigate in mixed traffic.

Design Summary

- Design approaches/exits to the lowest speeds possible. 10-15 mph preferred with 25 mph maximum circulating design speed.
- Allow bicyclist to exit the roadway onto a separated bike lane or shared use path that circulates around the roundabout.
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.


Truck apron can provide adequate clearance for longer vehicles
W11-15
Separated bike lane, or shared use path should be wide enough for all user types.
Bicycle exit ramp to on-street bike lane or maintain separated bike lane.
Visible, well marked crossings alert motorists to the presence of bicyclists and pedestrians (W11-15 signage)
Bicycle ramps leading to a separated bike lane or shared use path

Guidance

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- FHWA. Roundabouts: An Informational Guide. 2000.
- TRB. Roundabouts: An Informational Guide, Second Edition. NCHRP 672. 2010.

Cost

- Roundabouts cost $250,000 - $500,000 depending on the size, site conditions, and right-of-way acquisitions. Roundabouts usually have lower ongoing maintenance costs than traffic signals, depending on whether the roundabout is landscaped.

PROTECTED INTERSECTIONS

A protected intersection uses a collection of intersection design elements to maximize user comfort within the intersection and promote a high rate of motorists yielding to people bicycling. The design maintains a physical separation within the intersection to define the turning paths of motor vehicles, slow vehicle turning speed, and offer a comfortable place for people bicycling to wait at a red signal.

Discussion

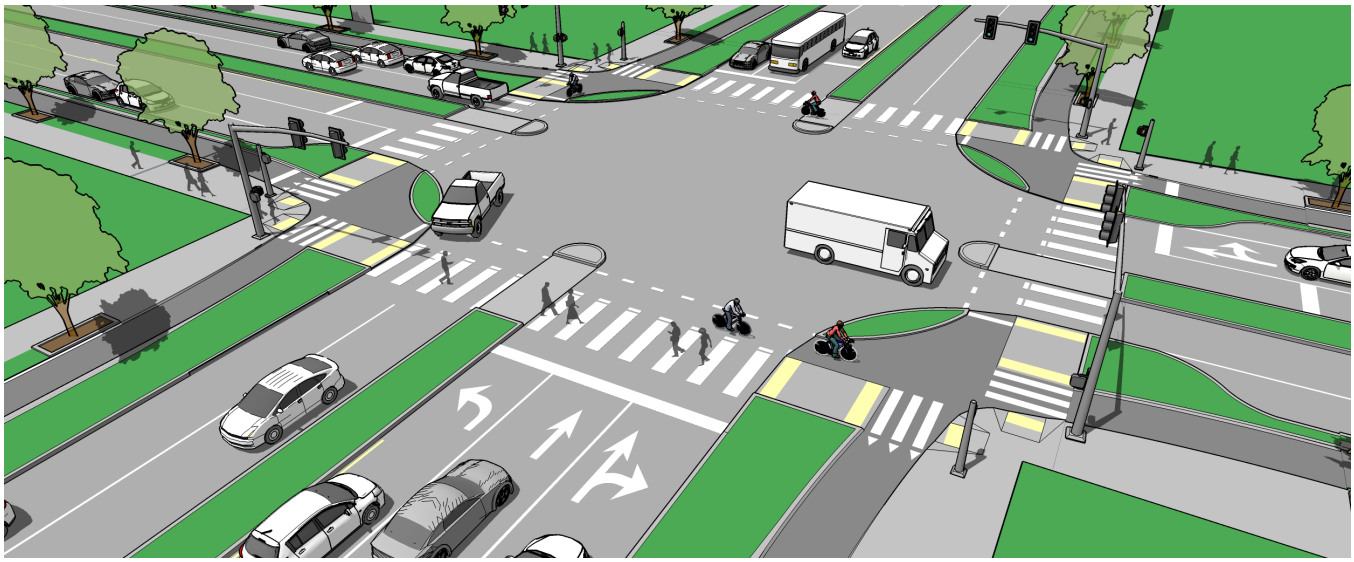
Protected intersections are included in the 2015 Caltrans DIB 89.

Colored pavement may be used within the corner refuge area to clarify use by people bicycling and discourage use by people walking or driving.

Intersection approaches with high volumes of right turning vehicles should provide a dedicated right turn only lane paired with a protected signal phase. Protected signal phasing may allow different design dimensions than are described here.

Design Summary

- Setback bicycle crossing of 16.5 feet allows for one passenger car to queue while yielding. Smaller setback distance is possible in slow-speed, space constrained conditions.
- Corner safety island with a 15-20 foot corner radius slows motor vehicle speeds. Larger radius designs may be possible when paired with a deeper setback or a protected signal phase, or small mountable aprons.
- Intersection crossing markings should be used.



References

- Caltrans. DIB 89: Class IV Bikeway Guidance.2015.
- FHWA. Separated Bike Lane Planning and Design Guide. 2015.
- MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

Cost

- Reconstruction costs comparable to a full intersection.
- Retrofit implementation may be possible at lower costs if existing curbs and drainage are maintained.

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PEDESTRIAN FACILITY DESIGN

PEDESTRIAN FACILITY DESIGN

SIDEWALK WIDTHS

Medium to high-density pedestrian zones located in areas with commercial or retail activity provide excellent opportunities to develop an inviting pedestrian environment. The frontage zone in retail and commercial areas may include seating for cafés and restaurants or extensions of retail establishments. The furnishings zone may include seating, transit shelters, newspaper racks, water fountains, utility boxes, lampposts, street trees and other landscaping. The medium to high-density pedestrian zone should provide an interesting and inviting environment for walking and window shopping.

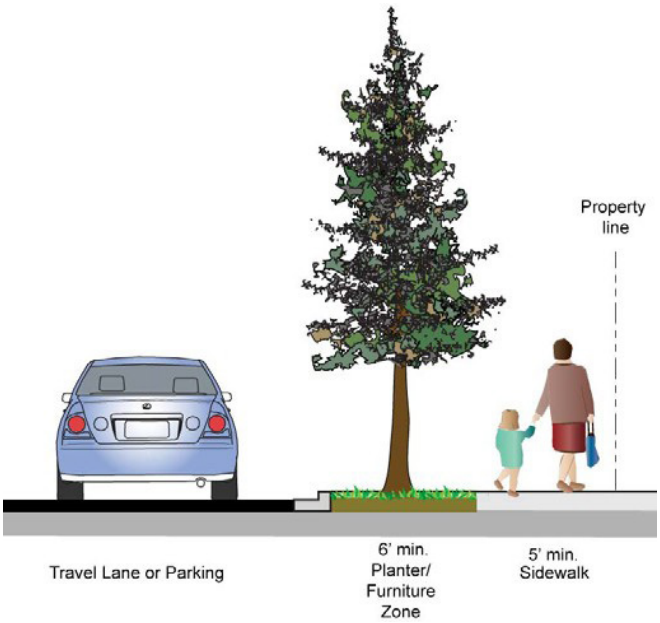
Design Summary

Width Considerations

The ITE recommends planning sidewalks that are a minimum of 5 feet wide with a planting strip of 2 feet on local streets and in residential and commercial areas.

The Caltrans HDM establishes 8 feet minimum width for sidewalks between curbs and buildings when in urban and rural main street place types. For all other locations, the minimum width should be 6 feet when adjacent to a curb or 5 feet when separated by a planting strip.

TRPA/TMPO recommends all new development provide width for shared-use paths where feasible, and if close to a connecting path. If a standard shared-use path is not feasible then as a wide a sidewalk as possible should be implemented. Asphalt is preferred over concrete for active transportation comfort. The use of vertical-face or rolled curbs is determined by stormwater best management practices, impacts on snow maintenance operations, and safety of road users.



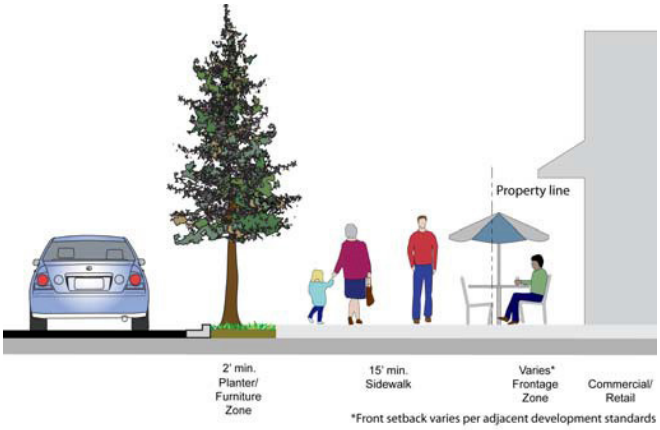
Typical Sidewalk on Arterial/Major Collector

References

- Institute of Transportation Engineers. Design and Safety of Pedestrian Facilities. 1998.
- AASHTO. Guide for the Planning, Design, and Operation or Pedestrian Facilities. 2004.
- Caltrans. Highway Design Manual. 2015.
- US Access Board. Accessible Public Rights-of-Way Planning and Design for Alterations. 2007.

Cost

- Sidewalk, concrete: $240,000 - $750,000 (with curb and gutter) per mile



Typical Commercial Area Sidewalk

SIDEWALK MATERIAL

Sidewalks should be firm and stable, and resistant to slipping. Sidewalks are normally constructed out of Portland cement concrete. Although multi-use pathways may be constructed out of asphalt, it is not suitable for sidewalk construction due to its shorter lifespan and higher maintenance costs. Asphalt and concrete are the most common surfaces for sidewalks; however, some sidewalks are designed using decorative materials, such as brick or cobblestone. Although these surfaces may improve the aesthetic quality of the sidewalk, they may also present challenges to people with mobility impairments. For example, tiles that are not spaced tightly together can create grooves that catch wheelchair casters. Concrete may not hold up as well under snowy conditions.

Discussion

Facilities should be designed so that they are easy to maintain. Of particular importance is including an area for snow storage adjacent to sidewalks, on-street facilities and pathways. Currently, Caltrans and NDOT use sidewalks and paths adjacent to roadways as temporary snow storage areas, resulting in degradation and limited access.

Wherever possible, sidewalks should be separated from the roadway by a paved or landscaped furnishing zone. This zone should be used for locating trees, landscaping, lighting, and for seasonal snow storage outside of the through paths of pedestrians.

Tahoe City Sidewalk

Asphalt Surfacing (non local)

Design Summary

In the Lake Tahoe Region, some Area Plans or local jurisdictions provide design guidelines for sidewalk materials. For example, the City of South Lake Tahoe City-Wide Design Standards state that sidewalks shall be constructed of asphalt (or concrete subject to City approval). The El Dorado County Transit Authority states that sidewalks should be constructed of an impervious material, such as concrete and that surfaces should be non-slip, stable, firm, and well-drained. Other jurisdictions do not recommend or require a specific material type.

Asphalt

- Maintenance life: 40 years plus (with no tree root damage)
- Cost: $2.89/sq ft [1], 20 Year Cost : $1.44/sq ft

1 The 20-year cost normalizes the cost by the useful product life.

Concrete

- Maintenance life: up to 75 years plus (with no tree root damage)
- Cost: $3.37/sq ft, 20 Year Cost: $0.90/sq ft

Concrete Pavers

- Acceptable material for use where aesthetic treatment is desired. May be best suited for the Furnishings Zone as streetscape accent where pedestrian through travel is not expected. Not recommended for use on sidewalk through-zone.
- Maintenance life: 20 years plus
- Cost: $5.77/sq ft, 20 Year Cost: $5.77/sq ft

Concrete Surfacing (non local)

References

- AASHTO. Guide for the Planning, Design, and Operation or Pedestrian Facilities. 2004.

Cost

- Asphalt: $2.89/sq ft
- Concrete: $3.37/sq ft
- Concrete pavers: $5.77/sq ft

FURNISHINGS

The furnishings zone is the area between the curb zone and the through passage zone, where pedestrians pass. The furnishings zone creates an important buffer between pedestrians and vehicle travel lanes by providing horizontal separation, and can also be used for snow storage in the winter time.

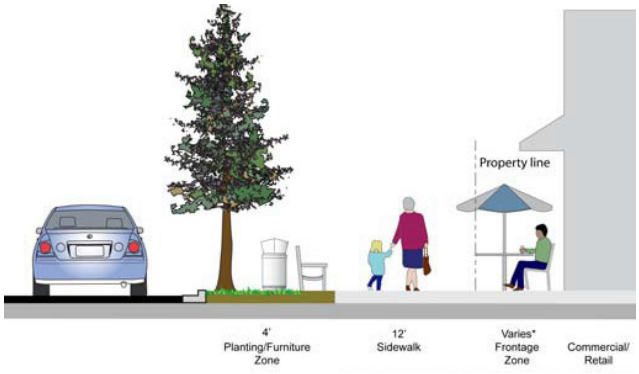
Design Summary

Width

A minimum width of 24 inches (48 inches if planting trees) is recommended. On sidewalks of ten feet or greater, the furnishings zone width should be a minimum of four feet. A wider zone should be provided in areas with large planters and/or seating areas. The TRPA recommends a minimum 6 foot wide landscaped buffer on arterials and major collectors.

Transit Stop/Shelter Placement

BlueGO and Tahoe Area Regional Transit (TART) on the North Shore both have guidelines for transit shelter design and placement, which can be obtained by contacting these agencies.

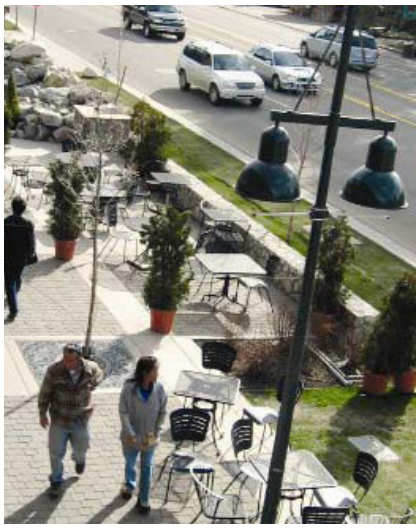


Street Trees and Plantings

Wherever the sidewalk is wide enough, the furnishings zone should include street trees. In order to maintain line of sight to stop signs or other traffic control devices at intersections, when planning for new trees, care should be taken not to plant street trees within 25 feet of corners of any intersection. However, native plants and bioswales can be used in these areas as long as they do not obstruct the vision of road users.

Street Furniture and Amenities

Street furniture should be placed in the furnishings zone to maintain through passage zones for pedestrians and to provide a buffer between the sidewalk and the street.



References

- FHWA. Designing Sidewalks and Trails for Access Part II of II: Best Practices Design Guide. 2001.
- AASHTO. Guide for Planning, Design and Operation of Pedestrian Facilities. 2010.
- USDOT. ADA Standards for Transportation Facilities. 2006.
- El Dorado County Transit Authority. Transit Design Manual. 2007.

Cost

- Bus Shelter: $5,340 - $10,800 each
- Bus concrete pad: $1,200 to $6,940 each
- Trees: $50 - $880 each

PEDESTRIAN FACILITY DESIGN

CURB RAMPS

Curb ramps are necessary for people who use wheelchairs to access sidewalks and crosswalks. ADA requires the installation of curb ramps in new sidewalks, as well as retrofitting existing sidewalks. Curb ramps may be placed at each end of the crosswalk (perpendicular curb ramps), or between crosswalks (diagonal curb ramps).

Design Summary

Orientation and Alignment

Perpendicular curb ramps should be used at large intersections. Curb ramps should be aligned with crosswalks, unless they are installed in a retrofitting effort and are located in an area with low vehicular traffic.

Drainage

Adequate drainage should be provided to prevent flooding of curb ramps.

Detectable Warnings

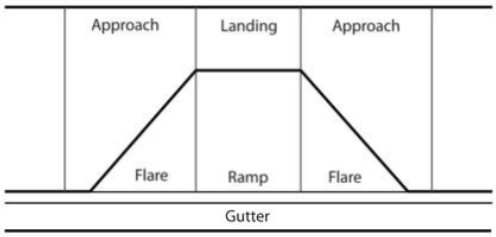
Detectable warnings, consisting of raised truncated domes that visually contrast with the surrounding materials, must be used to assist sight-impaired pedestrians in locating the curb ramp. Certain exemptions apply (see USDOT ADA Standards Section 406 and the ADA Access Board Guidelines on Accessible Public Rights of Way).

References

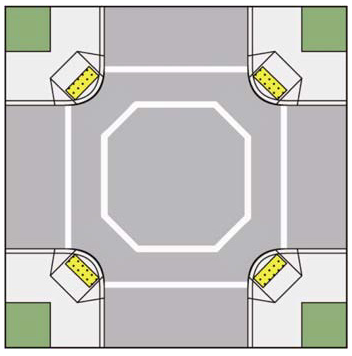
- AASHTO. Guide for Planning, Design and Operation of Pedestrian Facilities. 2004..
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- USDOT. ADA Standards for Transportation Facilities. 2006.
- ADA Access Board. Proposed Guidelines on Accessible Public Rights of Way. 2011.

Cost

- Curb Ramps, Retrofit (diagonal, per corner): $800 - $5,340 each
- Curb Ramps, Retrofit (perpendicular, per corner): $5,340 - $10,000 each



Typical Sidewalk on Arterial/Major Collector



Crosswalk Striping when using Diagonal Curb Ramps

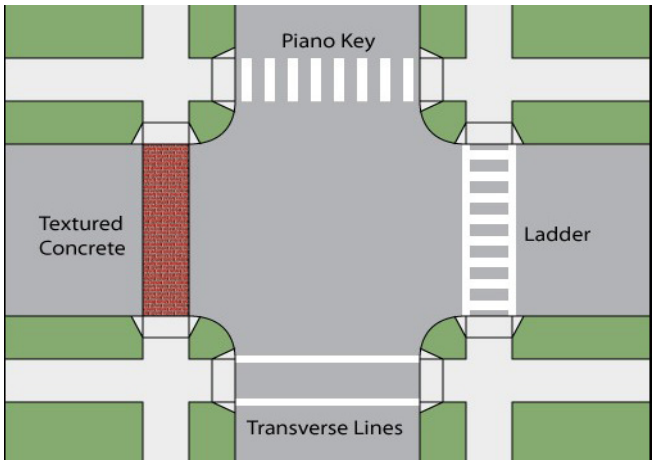
PEDESTRIAN INTERSECTION DESIGN

PEDESTRIAN CROSSWALK DESIGN

Crosswalks are to be marked on all legs of a signalized intersection. At unsignalized intersections, crosswalks should be marked when they help orient pedestrians, or help position pedestrians where they can best be seen by oncoming traffic. At mid-block locations, crosswalks are marked where there is a demand for crossing, and there are no nearby marked crosswalks.

Discussion

High-visibility markings such as Piano Key or Ladder crosswalks are recommended for crosswalks in the Tahoe Region due to their increased visibility and resistance to wear if they are located out of the wheel paths. Crosswalks forming transverse lines will wear quickly in snow country.



Crosswalk Types

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Design Summary

Ladder or piano key crosswalk markings are recommended for most crosswalks in the Tahoe Region, including school crossings, across arterial streets for pedestrian-only signals, at mid- block crosswalks, and where the crosswalk crosses a street not controlled by signals or stop signs.

- A piano key pavement marking consists of 2' wide bars spaced 2' apart.
- A ladder pavement marking consists of 2' wide bars spaced 2' apart.
- Transverse lines consist of 1' wide bars spaced no less than 6' apart.

Cost

- Crosswalk, Thermoplastic: $6 per sf
- Crosswalk, Transverse: $550 each
- Crosswalk, Permeable Pavement (brick, includes demo of existing): $14 per sf
- Crosswalk, Scored Concrete (includes demolition of existing): $9-$14 each

PEDESTRIAN REFUGE ISLANDS

Pedestrian refuge islands reduce pedestrian exposure to motor vehicles, allow pedestrians to consider traffic coming from one direction at a time and provide a place for slower pedestrians to rest or wait. Pedestrian refuge islands can be installed at intersections or at mid block locations.

Design Summary

Pedestrian refuge islands should be considered at all crossings of multi-lane roadways. Depending on the signal timing, median islands should be considered when the crossing distance exceeds 60 feet, but can be used at intersections with shorter crossing distances where a need has been recognized. **This treatment is recommended in school zones.**

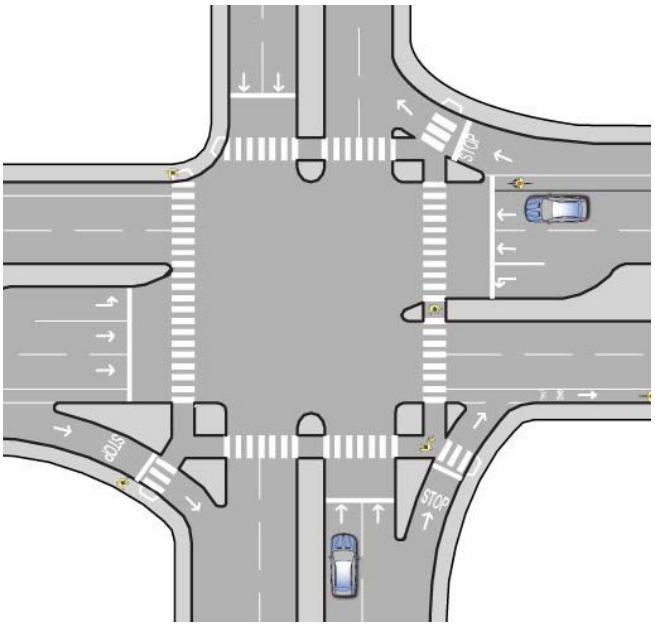
See the ADA Access Board Guidelines on Accessible Public Rights of Way for more information on median islands.

References

- ADA Access Board. Proposed Guidelines on Accessible Public Rights of Way. 2011.
- AASHTO. Guide for the Development of Pedestrian Facilities. 2004.
- AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities. 2010.

Cost

- Median, Pedestrian Refuge Island: $8,500-$33,000 each



The median "noses"shown are not required by MUTCD.

Median "nose" (non-local)

PEDESTRIAN INTERSECTION DESIGN

IN-STREET CROSSWALK SIGNAGE

The In-Street Pedestrian Crossing (R1-6) sign should be used to remind users of laws regarding the right of way at an unsignalized pedestrian crossing (CA and NV). These paddles are installed at the center stripe of the roadway on the leading edge of the crosswalk. Approaching motorists are warned to yield to crossing pedestrians.

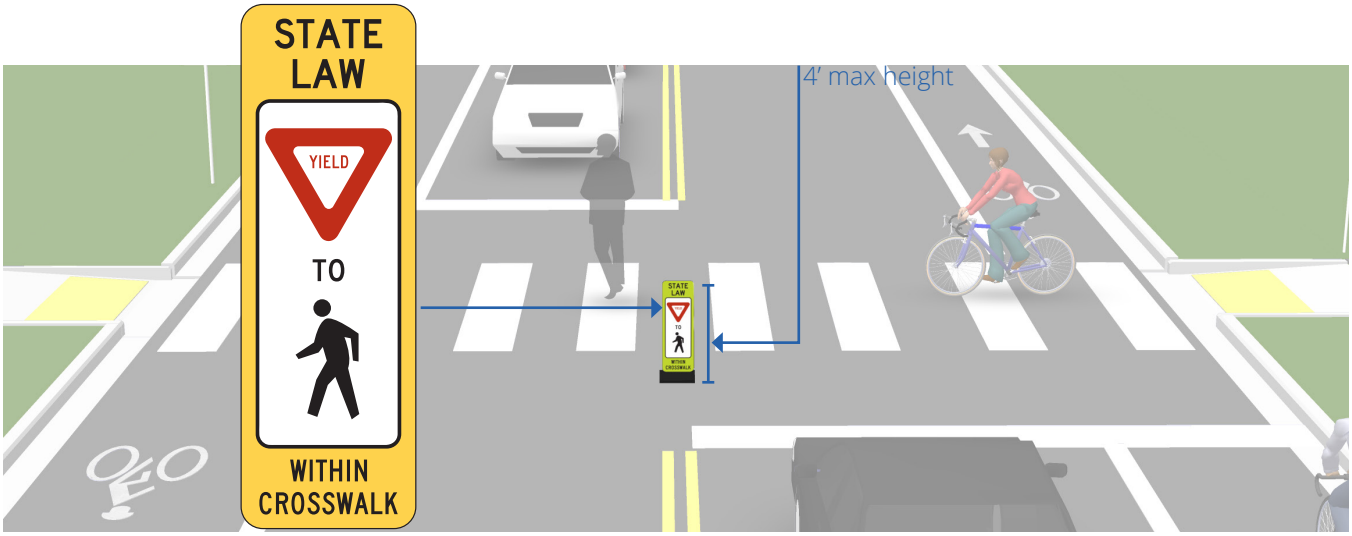
Discussion

These flexible signs must be extremely durable to withstand potential impacts with motor vehicles. Semi-permanent installations are also possible when the sign is combined with a movable base. This allows for day-time only applications. The signs perform better on narrow roadways, where the visibility of the signs is maximized. On multi-lane roadways, consider active warning beacons for improved yielding compliance.

This treatment is appropriate for crosswalks located in school zones.

Design Summary

- The in-street pedestrian crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island. The top of an in-street pedestrian crossing sign shall be a maximum of 4 feet above the pavement or median island surface.
- Install in a manner that does not impede pedestrian flow and outside the turn radius of vehicles that may be approaching from cross street.
- May be placed on a median island (when available).



References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Pedestrian Facilities. 2004.

Cost

- Crosswalk, Thermoplastic: $6 per sf
- Crosswalk, Transverse: $320-$550 each
- Crosswalk, Permeable Pavement (brick, includes demo of existing): $14 per sf
- Crosswalk, Scored Concrete (includes demolition of existing): $9-$14 each

CURB EXTENSIONS (BULB OUTS)

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

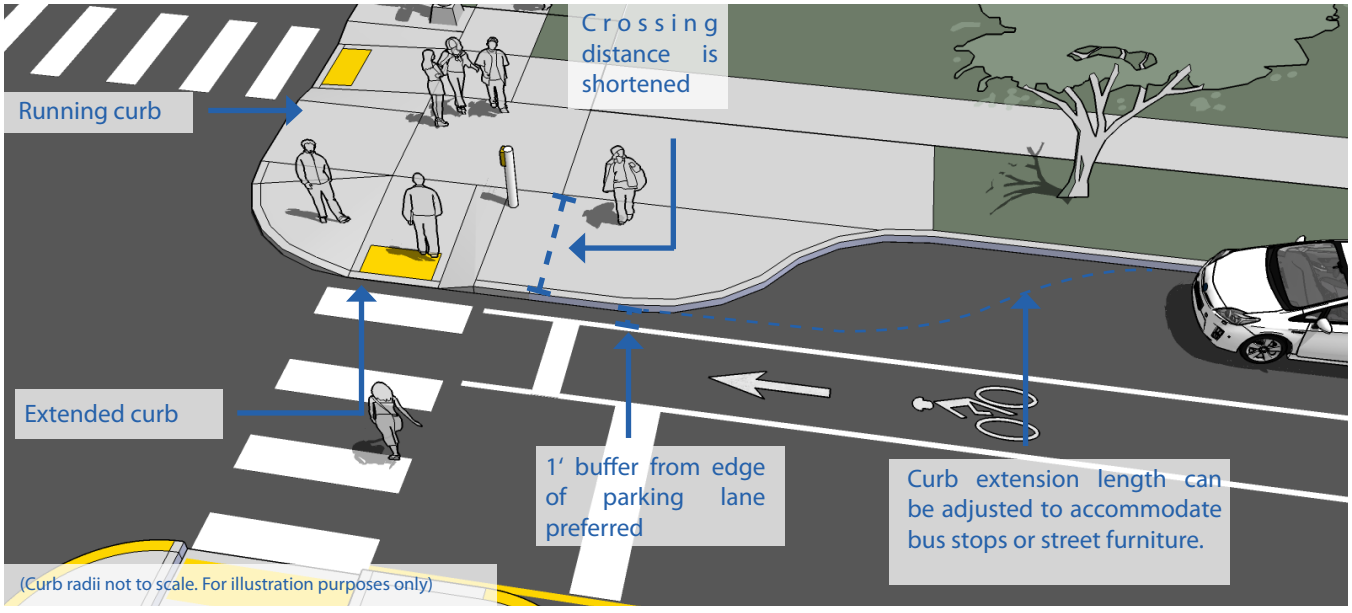
Discussion

Adding curb extensions may not be possible if there is no parking lane. Curb extensions should not block bike lanes or shoulders used by bicyclists.

This treatment is recommended at intersections in school zones.

Design Summary

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.


Crossing distance is shortened
Running curb
Extended curb
1' buffer from edge of parking lane preferred
Curb extension length can be adjusted to accommodate bus stops or street furniture.
(Curb radii not to scale. For illustration purposes only)

References

- AASHTO. Policy on Geometric Design of Highways and Streets. 2011.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Curb Extension: $12,000 each

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DESIGN OF INTERPRETIVE AND WAYFINDING SIGNAGE

INTERPRETIVE SIGNAGE

Interpretive signs enhance the trail or bikeway experience by providing information about the history and culture of the area. Signs may discuss local ecology, people, environmental issues, and other educational information. Educational information may be placed at scenic view areas or in relation to specific elements being interpreted. They may take on many forms including textual messages, plaques, markers, panels, and demonstrations.

Design Summary

Because interpretive signs need to relate directly to the needs of a site, no specific guidelines have been established for their format. However, interpretive signs should be concise and should be an integral part of an overall area sign plan.

Cost

- Signs, Path Wayfinding / Information: $550 - $2,000 each

WAYFINDING SIGNAGE - LOCAL GUIDELINES

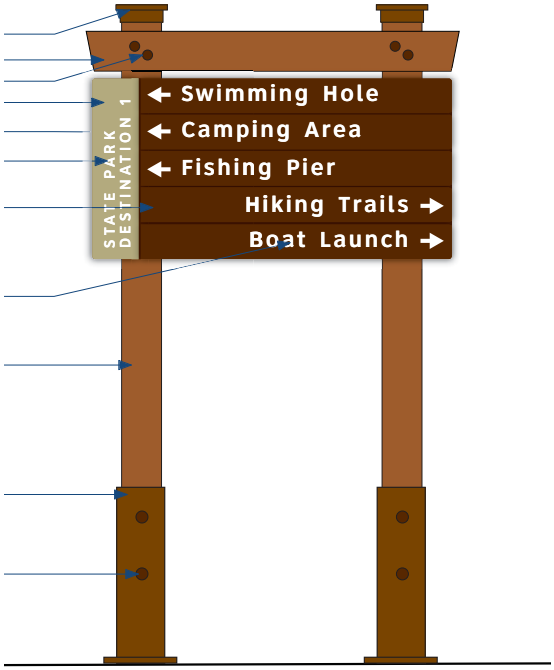
Three local documents currently govern the design of wayfinding signs in the Tahoe area. The North Lake Tahoe Community Wayfinding Signage Design Standards Manual (May 2013) provides design standards related to community wayfinding in public-accessible areas, such as recreational areas, commercial zones or neighborhood districts. It includes clear, schematic concepts for signage design while remaining adaptable to variations in local features. This manual also contains information about applying for permits for signs.

South Lake Tahoe community wayfinding standards are presented in the Wayfinding in South Lake Tahoe Status Report #3 (August 2008). Guidelines specific to bicycle route wayfinding in South Lake Tahoe are provided in the South Lake Tahoe Bicycle Transportation Signage System report (May 2013). The guidelines build upon and enhance standard wayfinding signs in the California MUTCD.

Design Summary

Unless superseded by locally approved design standards, Signage shall conform to the National MUTCD when in Nevada and CA MUTCD in California.

On bicycle wayfinding, mileage should be listed to the right side of each destination.



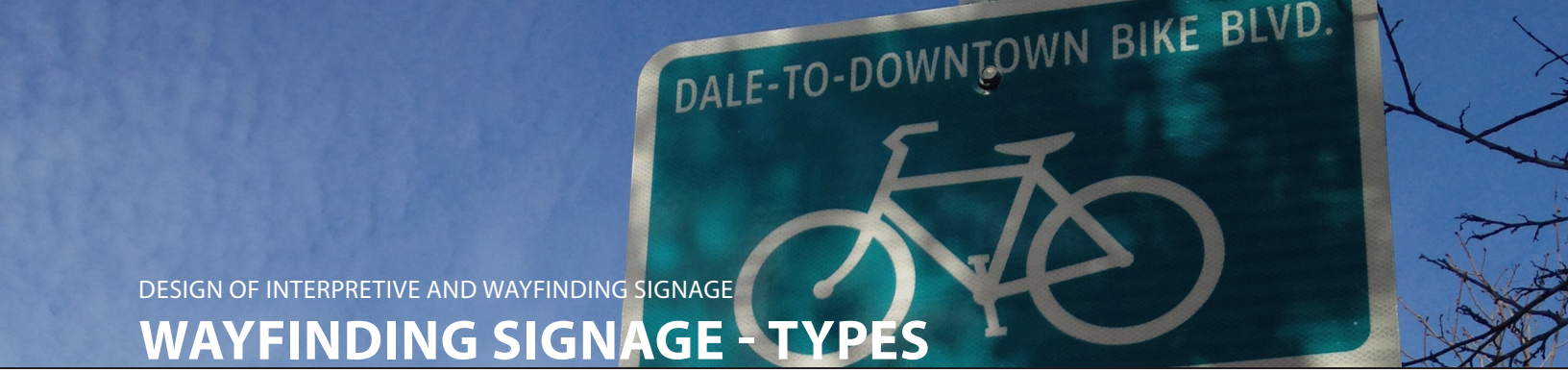
Example sign assembly from the North Lake Tahoe Community Wayfinding Signage Design Standards Manual

References

- North Lake Tahoe Community Wayfinding Signage Design Standards Manual (May 2013)
- South Lake Tahoe Bicycle Transportation Signage System (May 2013)
- Wayfinding in South Lake Tahoe Status Report #3 (August 2008)

Community Wayfinding in South Lake Tahoe

Bicycle specific wayfinding design from the South Lake Tahoe Bicycle Signage System Report.



WAYFINDING SIGNAGE - TYPES

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs: confirmation signs, turn signs, and decision signs.

Discussion

Confirmation Signs

Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.

Can include destinations and distance/time. Do not include arrows.

Turn Signs

Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.

Include destinations and arrows.

Decisions Signs

Mark the junction of two or more bikeways.

Inform bicyclists of "four D's," distance, direction, duration and destinations.

Travel times are optional but recommended.

Design Summary

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2012.
- Caltrans. Highway Design Manual. 2015.

Cost

- Sign, regulatory: $150 - $250 per sign

WAYFINDING SIGNAGE - PLACEMENT

Wayfinding signage acts as a "map on the street" for cyclists, pedestrians, and path users. Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Discussion

Confirmation Signs

Every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign). Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

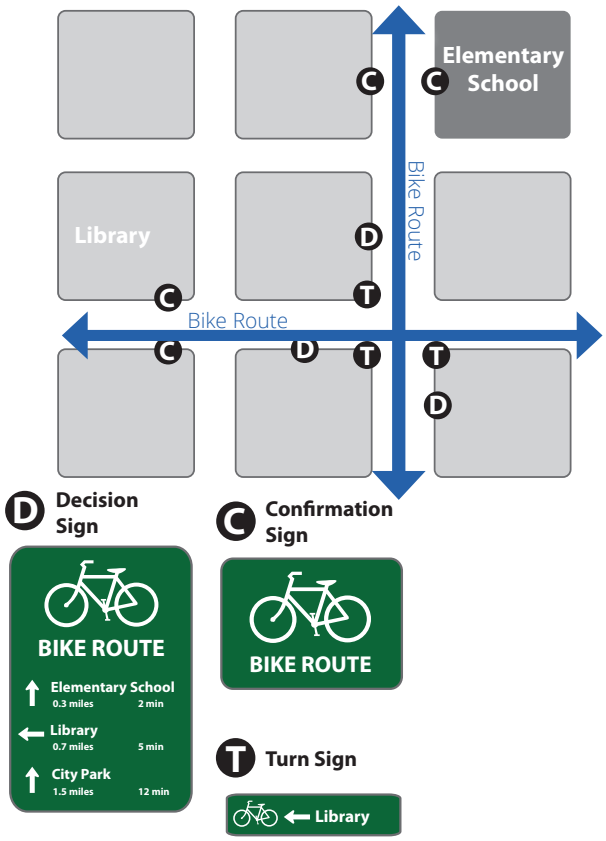
Turn Signs

Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.

Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.

Along a route to indicate a nearby destination.



Design Summary

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's presence on the sign can be a function of its physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Sign, regulatory: $150 - $250 per sign

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SUPPORT AND END OF TRIP FACILITIES

SUPPORT AND END OF TRIP FACILITIES

RECOMMENDED RATES OF BICYCLE PARKING

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters. In addition, safe and easy access to bicycle parking facilities is necessary to encourage commuters to access transit via bicycle. Providing bicycle access to transit and space for bicycles on buses and rail vehicles can increase the feasibility of transit in lower-density areas, where transit stops are beyond walking distance of many residences. People are often willing to walk only a quarter-mile to half-mile to access a bus stop, while they might bike as much as two or more miles to reach a transit station.

Discussion

Bicycle parking rack styles vary from simple inverted-U racks in concrete to more flexible styles that can be moved around to accommodate the seasons.

Short-Term Bicycle Parking

Design Standards

- All bicycle parking facilities should be dedicated for the exclusive use of bicycles.
- Short-term bicycle parking serves users who will park for less than two hours, typically for shopping and recreation. This type of parking should be convenient. Short-term parking is typically provided with bicycle racks (see table below).
- Long-term bicycle parking should serve users who park their bicycles for a period longer than two hours. This type of parking should provide a high level of security. Long-term parking is typically provided with bicycle lockers and bicycle cages (see table below).
- The rates below are minimums. Actual use of areas may indicate additional parking capacity is needed. Both short-term and long-term parking should be required.

References

- TRPA. Code of Ordinances
- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines.

Costs

- Bicycle racks: $175-$300 each
- Bicycle lockers: $665-$3,000 each

Bike parking requirements by land use

Land Use or location	Physical location	Short-Term Bicycle Parking Capacity	Long-Term Bicycle Parking Capacity
Multi-Family Residential (with private garage for each unit)	Near building entrance with good visibility	0.05 spaces for each bedroom (2 spaces minimum for whole complex	0
Multi-Family Residential (without private garage for each unit)	Near building entrance with good visibility	0.05 spaces for each bedroom (2 spaces minimum)	0.15 spaces for each bedroom (2 spaces minimum)
Park	Adjacent to restrooms, picnic areas, fields and other attractions	8 spaces	0
Schools	Near office entrance with good visibility	8 spaces	4 spaces per Classroom
Public Facilities (city hall, libraries, community centers)	Near main entrance with good visibility	8 spaces	1 space per 20 employees
Commercial, retail and industrial developments over 10,000 gross square feet	Near main entrance with good visibility	8 spaces per 10,000 square feet	2 locker spaces per 10,000 square feet
Shopping Centers over 10,000 gross square feet	Near main entrance with good visibility	8 spaces per 10,000 square feet	2 locker spaces per 10,000 square feet
Commercial Districts	Near main entrance with good visibility	4 spaces every 200 feet	0
Transit stations and/ or mobility hubs	Near boarding area or security guard	8 spaces	21 locker spaces for every 30 parking spaces

Secure bike parking area

SUPPORT AND END OF TRIP FACILITIES

BICYCLE PARKING

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

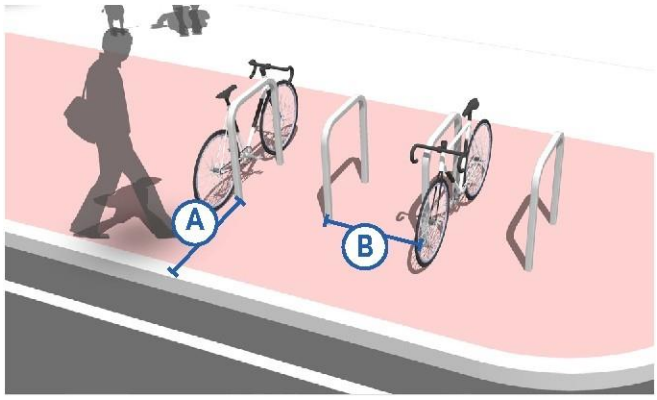
Typical Application

- Bike racks provide short-term bicycle parking and is meant to accommodate visitors, customers, and others expected to depart within two hours. It should be an approved standard rack appropriate location and placement, and weather protection.
- On-street bike corrals (also known as on-street bicycle parking) consist of bicycle racks grouped together in a common area within the street traditionally used for automobile parking. Bicycle corrals are reserved exclusively for bicycle parking and provide a relatively inexpensive solution to providing high-volume bicycle parking. Bicycle corrals can be implemented by converting one or two on-street motor vehicle parking spaces into on-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.
- Bicycle lockers are intended to provide long-term bicycle storage for employees, students, residents, commuters, and others expected to park more than two hours. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain.
- A Secure Parking Area for bicycles, also known as a Bike Spa or Bike & Ride (when located at mobility hubs), is a semi-enclosed space that offers a higher level of security than ordinary bike racks. Accessible via key-card, combination locks, or keys, Bike SPAs provide high-capacity parking for 10 to 100 or more bicycles. Increased security measures create an additional transportation option for those whose biggest concern is theft and vulnerability.

Design Features

Bike Racks

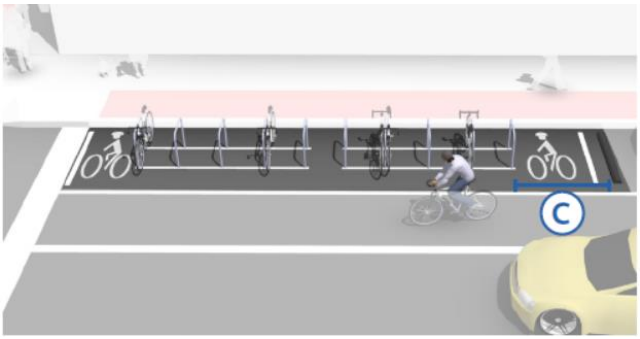
- (A) 2 feet minimum from the curb face to avoid 'dooring.'
- (B) 4 feet between racks to provide maneuvering room.
- Locate close to destinations; 50 feet maximum distance from main building entrance.
- Minimumcleardistanceof6feetshould be provided between the bicycle rack and the property line.

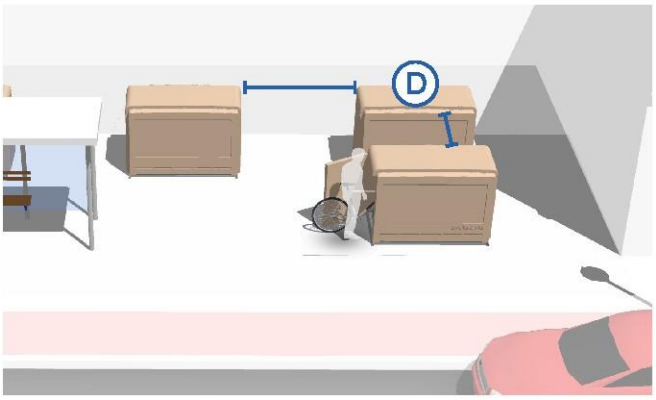


Perpendicular Bike Racks

Bike Corrals

- Bicyclists should have an entrance width from the roadway of 5-6 feet.
- (C) Can be used with parallel or angled parking.
- Parking stalls adjacent to curb extensions are good candidates for bicycle corrals since the concrete extension serves as delimitation on one side.
- Bike corrals are great additions for existing residential buildings that may not have bike rooms. Covered corrals are encouraged however check with local and regional regulations regarding coverage.





Bike Lockers

- Minimum dimensions: width (opening) 2.5 feet; height 4 feet to depth 6 feet.
- 4 foot side clearance and 6 foot end clearance.
- (D) 7 foot minimum distance between facing lockers

Secure Parking Area

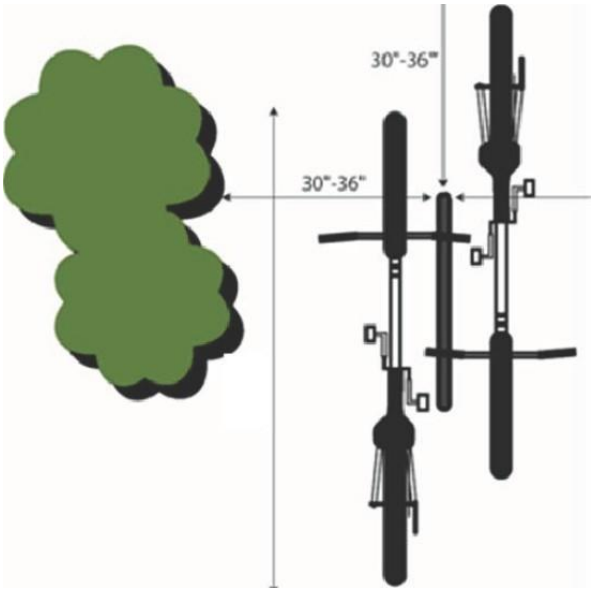
- Closed-circuit television monitoring with secure access for users are great options for residential and commercial uses.
- (E) Double high racks & cargo bike spaces with the ability to lock up a bike individually
- Bike repair station with bench and bike tube and maintenance item vending machine.
- Electrical outlets well placed for charging and even for maintenance tools.

SUPPORT AND END OF TRIP FACILITIES

BICYCLE RACK DESIGN

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that supports the bicycle in at least two places, preventing it from falling over, allows locking of the frame and one or both wheels with a U-lock, is securely anchored to ground, and resists cutting, rusting and bending or deformation.

Discussion



Design Summary

- Bicycle racks should be a design that is intuitive and easy to use.
- A standard inverted-U style or staple rack is recommended for Lake Tahoe.
- Bicycle racks should be securely anchored to a surface or structure and positioned racks out of the walkway's clear zone.
- The rack element (part of the rack that supports the bicycle) should keep the bicycle upright by supporting the frame in two places without the bicycle frame touching the rack. The rack should allow one or both wheels to be secured.
- Avoid use of multiple-capacity "wave" style racks. Users commonly misunderstand how to correctly park at wave racks, placing their bikes parallel to the rack and limiting capacity to 1 or 2 bikes.
- Position racks so there is enough room between parked bicycles. Racks should be situated on 36" minimum centers.
- A five-foot aisle for bicycle maneuvering should be provided and maintained beside or between each row of bicycle racks.
- Racks should be located close to a main building entrance, in a lighted, high-visibility area protected from the elements.

References

- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines.
- City of Oakland, CA. Bicycle Parking Standards.

Cost

- Bicycle racks: $175-$300 each

SUPPORT AND END OF TRIP FACILITIES

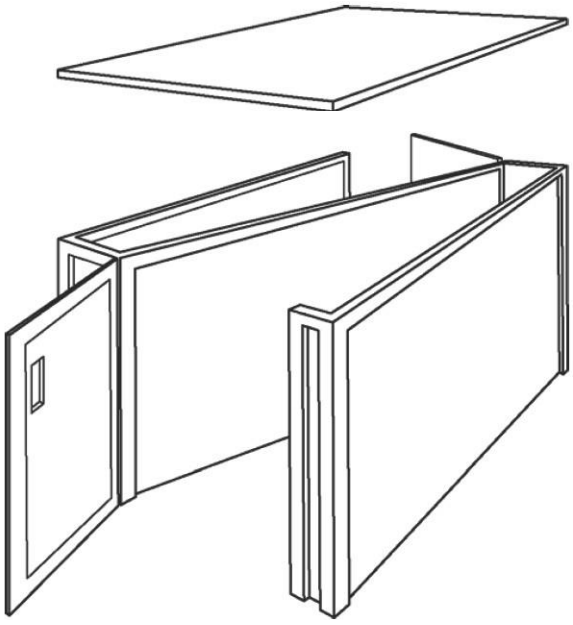
BICYCLE LOCKER DESIGN

Bicycle lockers are intended to provide long-term bicycle storage for employees, students, residents, commuters, and others expected to park more than two hours. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain. Bicycle lockers provide space to store a few accessories or rain gear in addition to containing the bicycle. Some lockers allow access to two users- a partition separating the two bicycles can help users feel their bike is secure. Lockers can also be stacked, reducing the footprint of the area, although that makes them more difficult to use.

Discussion

Bicycle Parking Manufacturers:

- Palmer: www.bikeparking.com
- Dero: www.dero.com
- Creative Pipe: www.creativepipe.com
- Cycle Safe: www.cyclesafe.com



Design Summary

- Bicycle lockers should be a design that is intuitive and easy to use.
- Bicycle lockers should be securely anchored to a surface or structure.
- Bicycle lockers should be constructed to provide protection from theft, vandalism, and weather.
- A five-foot aisle for bicycle maneuvering should be provided and maintained beside or between each row of bicycle lockers.
- Lockers should be located close to a main building entrance, in a lighted, high-visibility area protected from the elements. Long-term parking should always be protected from the weather.

References

- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines.
- City of Oakland, CA. Bicycle Parking Standards.

Cost

- Bicycle lockers: $665 -$3,000 each

SUPPORT AND END OF TRIP FACILITIES

SHOWERS AND LOCKERS

Discussion

Shower and locker facilities at large commercial developments encourage bicycling by providing storage space for clothing and an opportunity to freshen up before work. Employees who exercise on their lunch break can also benefit from shower and locker facilities.

Design Summary

- Two shower facilities (one per gender) should be provided by employers of 100-200 persons.
- 20 lockers (10 per gender) should be provided by employers of 100-200 persons.
- Four shower facilities (two per gender) should be provided by employers of more than 200 persons. An additional four showers (two per gender) should be provided for every additional 500 employees over the initial 200 employees.
- 40 lockers (20 per gender) should be provided by employers of more than 200 persons. An additional 20 lockers (10 per gender) should be provided for every additional 500 employees over the initial 200 employees

Cost

- Costs Vary

References

- Association of Bicycle and Pedestrian Professionals Bicycle Parking Guidelines.
- City of Oakland, CA. Bicycle Parking Standards.

MAINTENANCE STANDARDS

SHARED-USE PATH MAINTENANCE STANDARDS

Standards Summary

SURFACE GAP REPAIR

To provide for accessibility and functionality for all users, shared use paths must be maintained to provide a continuous clear width of firm stable surface.

Path Surface

- The surface of the pedestrian access route shall be firm, stable and slip resistant (US Access Board, PROWAG, Section R302.7).

Vertical Changes in Level

- Surface discontinuities shall not exceed ½ inch maximum. Vertical discontinuities between ¼ inch and ½ inch maximum shall be beveled at 1:2 minimum. The bevel shall be applied across the entire level change (PROWAG, Section R302.7.2). Changes in level greater than ½ inch shall be accomplished by means of an accessible ramp.

Gaps and Elongated Openings

- Walkway Joints and Gratings. Openings shall not permit passage of a sphere more than ½ inch in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel (PROWAG, Section R302.7.3).

Discussion

Basic Maintenance

- Path pavement should be repaired as needed to avoid safety issues and to ensure ADA compliance.
- Paths should be swept regularly.
- Shoulder vegetation should be cleared and trimmed regularly.

Long-Term Maintenance

- Paths should be slurry sealed, at minimum, 10 years after construction.
- Paths should receive an overlay, at minimum, 15 years after construction.

Maintenance Activity	Frequency
Surface gap repair	As needed (see additional guidance below)
Inspections	Monthly
Pavement sweeping/blowing	As needed, weekly in Fall
Snow removal	As needed, or as feasible
Pavement markings replacement	1-3 years, or as needed
Signage replacement	1-3 years, or as needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year, middle of growing season and early Fall
Tree and shrub plantings, trimming	1-3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

Maintenance Challenges

- Most agencies pay for sidewalk and path maintenance out of their maintenance and operations budget. This funding is generally enough to provide seasonal maintenance, but is not enough to fund long-term preventative maintenance, such as overlays.
- Grant funding is not generally available for maintenance activities.
- Paths with year-round use or with commuting utility should be cleared of snow.
- If snow is removed from paths, snow must be removed far enough back from the pavement so that it does not melt, refreeze and create black ice. Sand is not permitted on many paths because they are adjacent to the lake and sanding increases costs.
- Small plows, which have been purchased by some Lake Tahoe agencies, are not strong enough to clear heavy snows or densely packed snows. Specialized blowers may be needed to clear deep snow or snow that has condensed by freeze/thaw.

References

- ADA Access Board. Proposed Guidelines on Accessible Public Rights of Way. 2011.

Cost

- $1,000-14,000 per mile per year

ON-STREET FACILITY MAINTENANCE STANDARDS

Discussion

Basic Maintenance

Bicyclists often avoid shoulders and bike lanes filled with sanding materials, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept. Roadways should also be swept after automobile collisions.

Long-Term Maintenance

Roadway surface is a critical issue for bicyclists' quality. Bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Examine pavement quality and transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.

Street sweeper

Maintenance Activity	Frequency
Inspections	Seasonal - at beginning and end of summer
Pavement sweeping/blowing	As needed, weekly in Fall
Snow removal	As needed, or as feasible
Pavement sealing, potholes	5 - 15 years
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement (includes crosswalks)	1-3 years
Signage replacement	1-3 years
Shoulder plant trimming (weeds, trees, brambles)	Twice a year, middle of growing season and early Fall
Tree and shrub plantings, trimming	1-3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

Standards Summary

NOTE: Caltrans recommends tolerance of surface discontinuities no more than ½ inch wide when parallel to the direction of travel on bike lanes (Class II) and bike routes (Class III).

Cost

- $2,000 per mile per year

MAINTENANCE STANDARDS

SEPARATED BIKE LANE MAINTENANCE

Separated bike lanes require increased maintenance effort compared to conventional bicycle lanes. Some designs are more maintenance-friendly than others and implications for snow storage, removal and clearance should be considered.

Discussion

All bikeways should be maintained free of debris, including snow, leaves and gravel.

Design Summary

Consider barrier type on snow storage.

- Street level separated bike lanes collect more debris than raised separated bike lanes. Fully raised sidewalk –level separated bike lanes may be plowed at the same time as the adjacent sidewalk. Bollards may be designed for seasonal removal to allow for plowing during snow events.

Design for access and egress

- Snow removal vehicles must be able to maneuver into and out of the separated bike lane.

Design adequate width for sweepers

- A clear bike lane/buffer width of 10' should be considered for maximum compatibility with most snowplow equipment. Smaller sized sweepers should be used when facilities are smaller than this size.

Provide capacity for snow storage

- Snow should not be stored within the through-zone of the bike lane. Snow may be stored in the separated bike lane buffer area, or the furnishing zone of the adjacent sidewalk.

Separated bike lanes should be promptly cleared after snow events.

Fallen leaves accumulating separated bike lanes cause hazardous conditions in wet weather.

References

- FHWA. Separated Bike Lane Planning and Design Guide. 2015.

Appendix B

Tahoe Transportation Survey

Tell Us About Transportation Safety in Tahoe

The first 5 questions apply to transportation in the Tahoe Region as a whole:

What is your primary mode of transportation in a typical week?

A. Walking/rolling
B. Bicycle
C. Transit
D. Vehicle
E. Motorcycle
F. Shared Mobility/E-scooters
G. Using a special transportation service, such as one for seniors or persons with disabilities

Please circle how you feel about the following statement:

The Lake Tahoe Region is a safe place for all road users—motorists, bicyclists, and pedestrians—to travel.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Please rate how you feel travelling by each mode of transportation:

	Very safe	Somewhat safe	Neutral	Somewhat unsafe	Very unsafe	I don't travel by this mode
Vehicle	○	○	○	○	○	○
Walking/Rolling	○	○	○	○	○	○
Bicycling	○	○	○	○	○	○
Transit	○	○	○	○	○	○
Motorcycle	○	○	○	○	○	○
Shared Mobility/E-scooters	○	○	○	○	○	○
Special Transportation Service (e.g. paratransit)	○	○	○	○	○	○

Which type of bicyclist do you most closely identify with?

A. Strong and Fearless: People willing to bicycle with limited or no bicycle-specific infrastructure
B. Enthused and Confident: People willing to bicycle if some bicycle-specific infrastructure is in place
C. Interested but Concerned: People willing to bicycle if high-quality bicycle infrastructure is in place
D. No Way, No How: People unwilling to bicycle but may if high-quality bicycle infrastructure is in place

Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. Have you heard of Vision Zero?

A. Yes
B. No

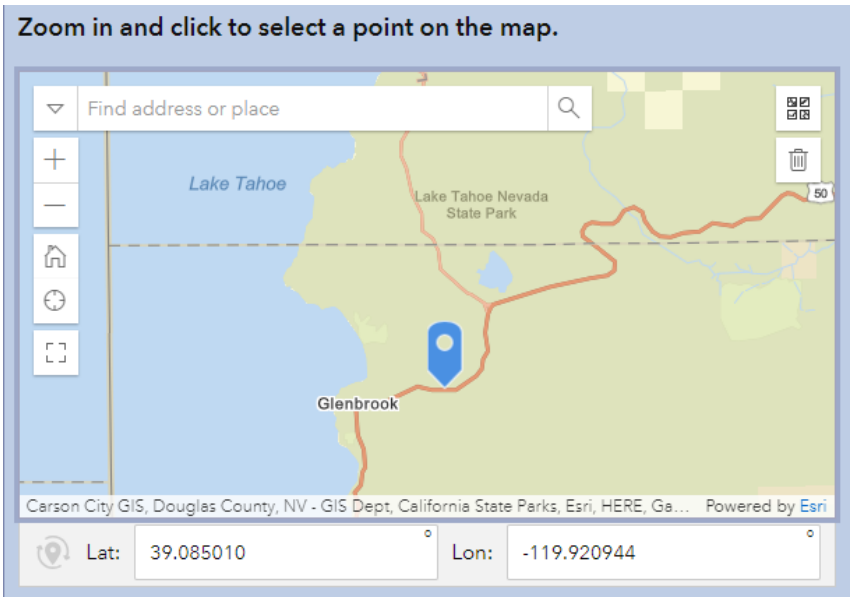
What are your biggest safety concerns while travelling in Tahoe? Select the top 3:

A. Speeding
B. Distracted driving
C. Driving under the influence
D. Not enough lighting
E. Not enough crosswalks
F. Not enough bicycle lanes or bicycle paths
G. Poorly maintained bicycle routes (snow, debris or potholes)
H. Winter weather conditions
I. Drivers not yielding to people in crosswalks
J. Poor sightline visibility (the length of roadway visible to a driver, i.e. at driveways, bicycle crossings, roundabouts)
K. Other:

_____

The following 5 questions apply to a specific location in the Tahoe Region. This could be a street, intersection, roundabout, bicycle lane, etc.

Which location would you like to provide feedback on? (You may comment on multiple locations.)


Zoom in and click to select a point on the map.
Find address or place
Lake Tahoe
Lake Tahoe Nevada State Park
50
Glenbrook
Carson City GIS, Douglas County, NV - GIS Dept, California State Parks, Esri, HERE, Ga... Powered by Esri
Lat: 39.085010
Lon: -119.920944

For this location, what mode of transportation would you like to give feedback on?

A. Bicycle
B. Walk
C. Assisted Mobility
D. Roll (scooter, skateboard, one-wheel)
E. Vehicle
F. Transit

How safe do you feel travelling at this location? (Circle below)

Safe or low-stress Neutral Unsafe or high-stress

If you selected unsafe, have you had a near miss at this location? A near miss is a narrowly avoided collision with another party.

A. Yes
B. No

Additional Comments

Please Tell Us A Little About Yourself

Which of the following best describes your residency in the Lake Tahoe Region?

A. Full-time resident
B. Seasonal resident
C. Commuter (live outside the basin, but commute to the basin to work)
D. Visitor

What's the zip code of your primary residence? _____

What is your age?

A. Under 18
B. 19-24
C. 25-34
D. 35-44
E. 45-54
F. 55-65
G. 65+

What gender do you identify as?

A. Female
B. Male
C. Non-binary
D. Transgender
E. Prefer not to say
F. Other _____

How many people live in your household (as a family unit)?

A. 1 person
B. 2 people
C. 3 people
D. 4 people
E. 5 people
F. 6 or more people

What is your total family income?

A. Under $20,000
B. $20,000 to $30,000
C. $31,000 to $40,000
D. $41,000 to $50,000
E. $51,000 to $75,000
F. $76,000 to $100,000
G. Above $100,000

Appendix C

Bicycle Level of Traffic Stress & Pedestrian Experience Index Technical Memorandums

Bicycle Level of Traffic Stress

report

prepared for

Tahoe Regional Planning Agency

prepared by

Cambridge Systematics, Inc.

November 16, 2023

www.camsys.com

technical report

Bicycle Level of Traffic Stress

prepared for

Tahoe Regional Planning Agency

prepared by

Cambridge Systematics, Inc.
38 East 32nd Street, 7th Floor
New York, NY 10016

date

November 16, 2023

Table of Contents

1.0 Executive Summary 1-1

2.0 Methodology 2-2

3.0 Stakeholder Engagement 3-4

4.0 Results and Future Work 4-5

Appendix A. 4-6

Appendix B. 4-8

List of Tables

Table 1: BLTS Measure 2-2
Table 2: BLTS Criteria for Segment with Bike Lane and Adjacent Parking Lane 4-6
Table 3: BLTS Criteria for Segment with Bike Lane, no Adjacent Parking Lane 4-6
Table 4: Criteria for Urban/Suburban Mixed Traffic Segment – 30 mph or less 4-7
Table 5: Criteria for Urban/Suburban Mixed Traffic Segment – 35 mph or More 4-7
Table 6: BLTS Criteria for Unsignalized Intersection Crossing Without a Median 4-8

List of Figures

Figure 1: Summary of BLTS Scores 1-1

Figure 2: Map of Stakeholder Engagement 3-4

1.0 Executive Summary

This document outlines the technical methodology for the Bicycle Level of Traffic Stress (BLTS) Analysis conducted in the summer and fall of 2023. Through a systematic evaluation process, the goal was to delineate the varying levels of stress encountered by bicyclists, thereby facilitating a nuanced understanding of the cycling environment. The results of this analysis provide an understanding of the level of bicycle comfort for each intersection and segment within the Tahoe Basin Area. The results are useful for understanding the existing baseline performance of transportation in terms of bicycle traffic stress.

A BLTS analysis is an approach used by transportation planners and engineers to evaluate the level of comfort of bicycling at a given location. It is a deterministic method of assessing the level of stress that bicyclists might experience when traveling on a particular street, intersection, or other bicycle facility.

Traffic stress analyses are useful for understanding how comfortable a given location within the transportation network feels for a person traveling along or across a given location. These analyses rely on environmental factors that the road user will encounter while traveling within the network, for example, average daily traffic volumes, roadway geometries, speed, number of lanes, and other features.

A score of 1 indicates a low-stress environment where bicycling is comfortable for people of all ages and abilities. A score of 2 indicates a moderately low-stress environment where bicycling is comfortable for most people but may be challenging for some. A score of 3 indicates a moderately high-stress environment where only experienced and confident bicyclists may feel comfortable. A score of 4 indicates a high-stress environment where only the most confident and skilled bicyclists would attempt to ride. The scoring approach is intended to align with the different skill and ability levels of people on the roads. The following summarizes each score.

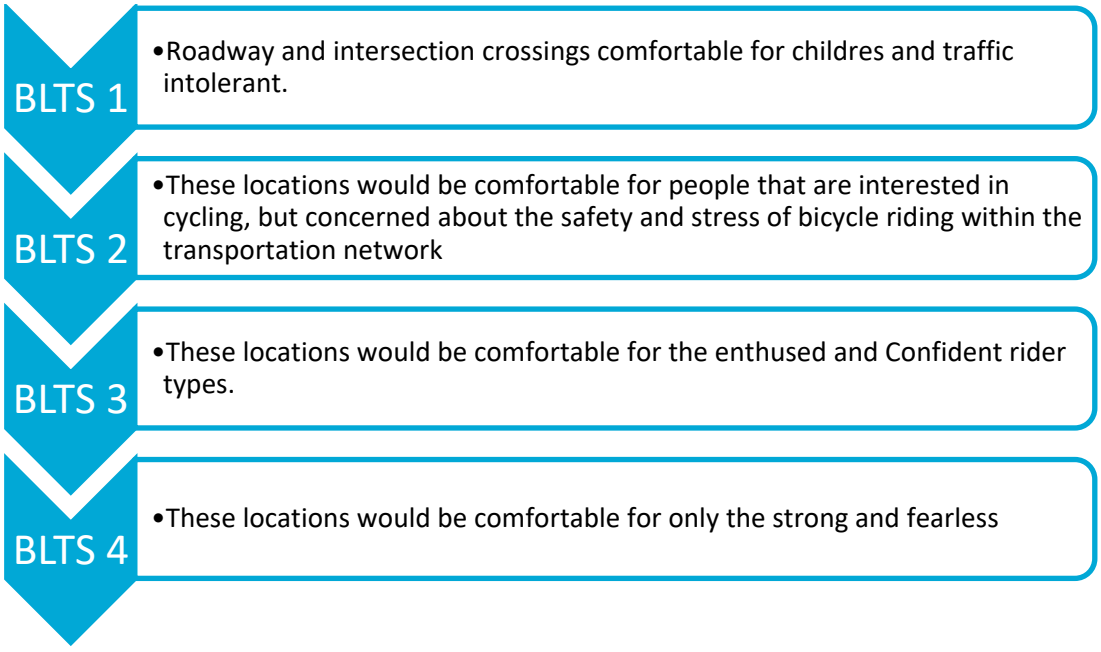

BLTS 1
•Roadway and intersection crossings comfortable for childres and traffic intolerant.
BLTS 2
•These locations would be comfortable for people that are interested in cycling, but concerned about the safety and stress of bicycle riding within the transportation network
BLTS 3
•These locations would be comfortable for the enthused and Confident rider types.
BLTS 4
•These locations would be comfortable for only the strong and fearless

Figure 1: Summary of BLTS Scores

2.0 Methodology

The bicycle level of traffic stress was measured across all paved road segment and intersection locations in the Tahoe Basin. The analysis considers all paved roads and shared-use paths in developing the scores. The team used the Oregon Department of Transportation and published in the Oregon Analysis Procedural Manual, Chapter 14[1] as guidance for conducting segment and intersection BLTS analyses.

This Oregon Procedure Manual provides a concise summary of various multimodal analysis types applicable to plans and projects of varying detail levels, including multimodal traffic stress, pedestrian level of traffic stress, and bicycle level of traffic stress. The manual delineates several variations of bicycle levels of traffic stress, encompassing intersection and segment-level BLTS analyses. This methodology leveraged intersection BLTS and urban/suburban BLTS scores as per the Manual guidelines. Comprehensive tables detailing BLTS scores for segments can be found in Appendix A, while scores for intersections are cataloged in Appendix B.

The assessment of the transportation system network in this study utilized data gathered during the fall and summer of 2023, with subsequent updates continuously integrated throughout the analysis period for the BLTS analysis.

The BLTS analysis takes into account various factors that influence rider discomfort. These include traffic volume, vehicle speed, the presence of bike lanes or other bicycle facilities, land use type, and other roadway characteristics. The analysis results in a numerical score from 1 to 4, with higher numbers indicating higher levels of stress. The project team added a score of 4.5 to the analysis to account for exceptionally stressful locations for cyclists within the Tahoe Basin. This includes several arterial roads, for example, Nevada State Route 28 between US Route 50 and Inline Village, and sections of California Route 89. All class I facilities were all scored with a BLTS score of 1.

During the evaluation of intersection, the project team discussed how to treat flashing beacon countermeasures in assigning the final BLTS scores at intersections. The team agreed to follow the suggestion of Peter Fruth to treat them as signalized intersections[2].

The thorough analysis considered multiple factors at the segment level to assess the level of traffic stress for bicyclists. These factors included the maximum posted speed limit, number of travel lanes, existing bicycle facilities, bicycle lane width, one-way travel, and average annual daily traffic. At the intersection level, the analysis scrutinized the intersection's characteristics, factoring in elements such as the number and type of traffic signals, maximum posted travel speed, maximum number of lanes, and functional classification.

The following summarizes the factors used to measure the level of traffic stress for each segment within the Tahoe Basin. The data sources are supplied in the table in the second column.

Table 1: BLTS Measure

Measure	Source	Utility
Number of Travel Lanes	TRPA, Open Street Map	Segment BLTS, Intersection

[1] https://www.oregon.gov/odot/planning/pages/apm.aspx

[2] https://peterfurth.sites.northeastern.edu/level-of-traffic-stress/

Maximum Speed Limit	TRPA, Open Street Map	Segment BLTS, Intersection
Average Annual Daily Traffic	Replica	Segment BLTS
One way designation	Open Street Map	Segment BLTS
Existing Bicycle Facilities	TRPA	Segment BLTS
Signalized Intersection	Open Street Map	Intersections BLTS
Functional Classification	Open Street Map	Segment BLTS, Intersection
Bicycle Facility Width	Open Street Map	Segment BLTS
Roadway Width	Open Street Map	Segment BLTS

In instances where specific information was absent in the source data, assumptions were judiciously made to address gaps. For example, when the maximum posted speed limit was unavailable, the road network's functional classification was utilized to infer the road's speed limit. This approach operated under the assumption that higher functional class roads generally have higher posted speed limits. The following describes assumptions made to fill data gaps, providing transparency regarding the methodology applied in the analysis.

One way

- no road was considered one way unless it was a motorway or had one a single lane

Number of lane

- 1: one way residential roads, Class I bicycle facility, or service road
- 2: residential roads or tertiary road,
- 4: primary and secondary arterials

Centerline

- Center lines were considered to be present in all cases except residential roads, Class I roads, service roads, and any road with only 1 lane.

Max Posted Speed Limtied

- 10 MPH: Class I bicycle infrastructure
- 25 MPH: All residential and service roads
- 30 MPH: Tertiary roads
- 40 MPH: Primary and secondary arterials

No roadside parking was available at the time of the analysis and all roads were assumed to allow roadside parking. Since no available pavement width data was available at the time of the analysis, all roads were considered 50 feet wide, Class I facilities were assumed to be 6 feet wide, and Class II and IV facilities were assumed to be 5 feet wide.

Each factor identified for the BLTS analyses were built onto a base road and intersections layer. These can be considered consolidated digital versions of the transportation network. Over 750 miles of roads within the Tahoe Basin were analyzed, and over 2500 intersections were analyzed.

Once the project team built the digital road networks, each location was scored independently. These draft results were shared with the project team before collecting feedback from the Bicycle Advisory Committee. This process is described in greater detail in the Stakeholder Engagement section.

3.0 Stakeholder Engagement

The project team employed an interactive map application to present the GIS data mentioned earlier to TRPA for evaluation. This approach facilitated the collection of location-specific comments, enabling the team to document responses systematically within an online repository. A screenshot of the map can be found in Figure 2.

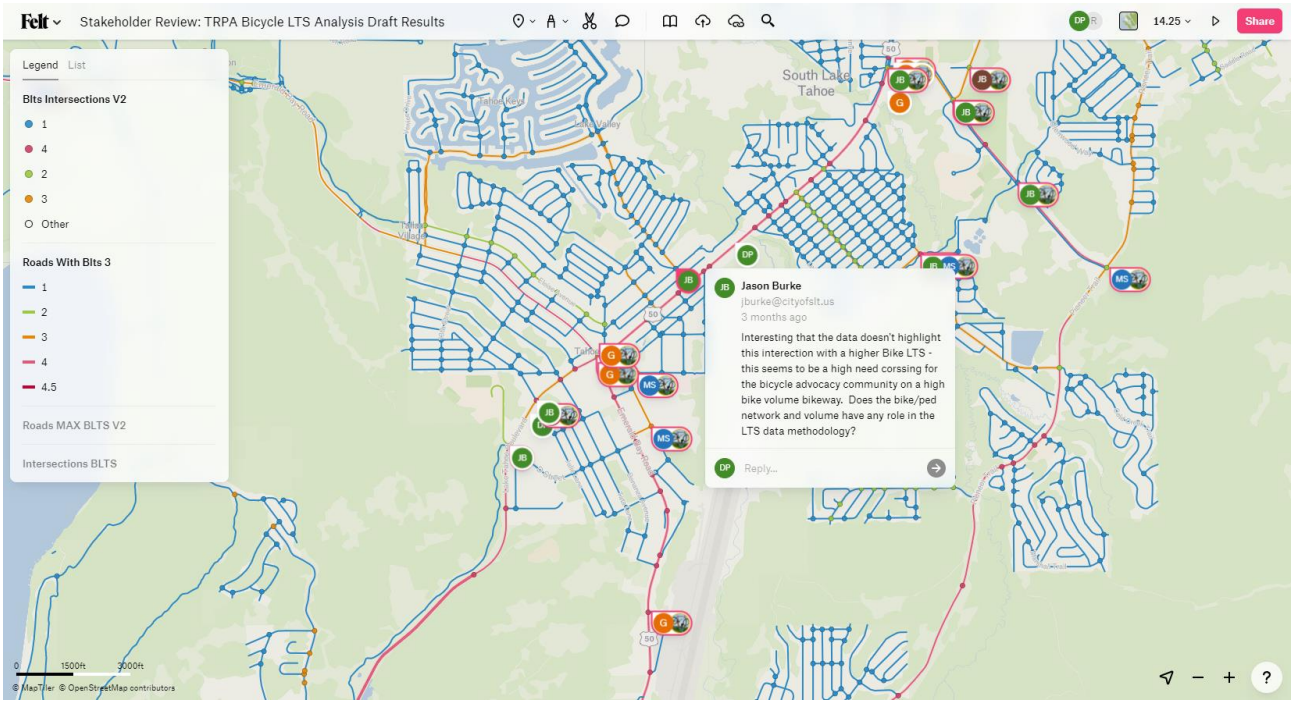


Figure 2: Map of Stakeholder Engagement

The project team enlisted the Bicycle Technical Advisory Committee to offer feedback on the preliminary BLTS analysis. A comprehensive total of 47 comments were submitted by members of this stakeholder group. The project team meticulously deliberated on each comment, engaging in detailed discussions and conducting follow-ups with individual members when necessary. Subsequently, all comments were integrated into the final BLTS results.

Every individual response underwent thorough scrutiny by the analysis team, and adjustments were implemented in alignment with the recommendations put forth during the review, as approved by the project management team.

4.0 Results and Future Work

The final results were delivered to TRPA in shapefile format. This included all roads and intersections included in the analysis. These data also included the attributes that contributed to the LTS score. These analysis results can be used in various ways, including:

- Help riders identify comfortable routes
- Inform bicycle wayfinding program implementation
- Identify gaps in the low stress bikeway network to inform facility plans and project prioritization
- Inform street project design decisions

As our understanding of urban mobility continues to evolve, the BLTS analysis presented in this study serves as a pivotal step toward enhancing the cycling experience within the TRPA planning area. However, recognizing the dynamic nature of transportation systems and the ongoing advancements in infrastructure design, additional avenues exist for future work and refinement of this BLTS analysis. The following highlights potential enhancements to the existing BLTS framework and additional use cases of the BLTS analyses.

- Expand the BLTS framework to include multi-modal measures of traffic stress
- Expand the BLTS to include pedestrian travel stress score
- Update the BLTS to include new and updated data sources when they become available, such as when new facilities or digital infrastructure data are available.
- Consider how improvements to the bicycle network will improve bicycle stress crossing and travel along segments.
- Identify which high-stress road segments do not have adjacent shared-use paths.

The BLTS analysis is a valuable tool for transportation planners and engineers to identify locations for investments into active transportation to make cycling safer and more accessible for people of all ages and abilities. By identifying areas of high stress and developing strategies to reduce that stress, communities can encourage more people to choose bicycling as a safe and convenient mode of transportation.

Appendix A.

Each of the following tables were sourced from the Oregon Analysis Procedures Manual Chapter 14.

Table 2: BLTS Criteria for Segment with Bike Lane and Adjacent Parking Lane

Prevailing or Posted Speed	1 Lane per direction			≥2 lanes per direction	
	≥ 15' bike lane + parking	14' – 14.5' bike lane + parking	≤ 13' bike lane + parking or Frequent blockage[1]	≥ 15' bike lane + parking	≤ 14.5' bike lane + parking or Frequent blockage[1]
≤25 mph	BLTS 1	BLTS 2	BLTS 3	BLTS 2	BLTS 3
30 mph	BLTS 1	BLTS 2	BLTS 3	BLTS 2	BLTS 3
35 mph	BLTS 2	BLTS 3	BLTS 3	BLTS 3	BLTS 3
≥40 mph	BLTS 2	BLTS 4	BLTS 4	BLTS 3	BLTS 4

Table 3: BLTS Criteria for Segment with Bike Lane, no Adjacent Parking Lane

Prevailing or Posted Speed	1 Lane per direction				≥2 lanes per direction	
	≥ 7' (Buffered bike lane)	5.5' – 7' Bike lane	≤ 5.5' Bike lane	Frequent bike lane blockage[1]	≥ 7' (Buffered bike lane)	<7' bike lane or frequent blockage[1]
≤30 mph	BLTS 1	BLTS 1	BLTS 2	BLTS 3	BLTS 1	BLTS 3
35 mph	BLTS 2	BLTS 3	BLTS 3	BLTS 3	BLTS 2	BLTS 3
≥40 mph	BLTS 3	BLTS 4	BLTS 4	BLTS 4	BLTS 3	BLTS 4

Table 4: Criteria for Urban/Suburban Mixed Traffic Segment – 30 mph or less

Number of Lanes	ADT (vph)[1]	Functional Class	Posted or Prevailing Speed (mph)		
			≤20	25	30
Unmarked Centerline	≤750	Local	BLTS 1	BLTS 1	BLTS 2
	750 - ≤1,500	Local /Collector	BLTS 1	BLTS 1	BLTS 2
	1,500 - ≤3,000	Collector	BLTS 2	BLTS 2	BLTS 2
	>3,000	Arterial	BLTS 2	BLTS 3	BLTS 3
1 through lane per direction	≤750	Local	BLTS 1	BLTS 1	BLTS 2
	750 - ≤1,500	Local /Collector	BLTS 2	BLTS 2	BLTS 2
	1,500 - ≤3,000	Collector	BLTS 2	BLTS 3	BLTS 3
	>3,000	Arterial	BLTS 3	BLTS 3	BLTS 3
2 through lanes per direction	≤8,000	Arterial	BLTS 3	BLTS 3	BLTS 3
	>8,000	Arterial	BLTS 3	BLTS 3	BLTS 4
3+ though lanes per direction	Any ADT	Arterial	BLTS 3	BLTS 3	BLTS 4

Table 5: Criteria for Urban/Suburban Mixed Traffic Segment – 35 mph or More

Number of Lanes	ADT (vph)[1]	Functional Class	Posted or Prevailing Speed (mph)		
			35	40	>45
Unmarked Centerline	≤750	Local	BLTS 2	BLTS 3	BLTS 3
	750 - ≤1,500	Local /Collector	BLTS 3	BLTS 3	BLTS 4
	1,500 - ≤3,000	Collector	BLTS 3	BLTS 4	BLTS 4
	>3,000	Arterial	BLTS 3	BLTS 4	BLTS 4
1 through lane per direction	≤750	Local	BLTS 2	BLTS 3	BLTS 3
	750 - ≤1,500	Local /Collector	BLTS 3	BLTS 3	BLTS 4
	1,500 - ≤3,000	Collector	BLTS 3	BLTS 4	BLTS 4
	>3,000	Arterial	BLTS 3	BLTS 4	BLTS 4
2 through lanes per direction	≤8,000	Arterial	BLTS 3	BLTS 4	BLTS 4
	>8,000	Arterial	BLTS 4	BLTS 4	BLTS 4
3+ though lanes per direction	Any ADT	Arterial	BLTS 4	BLTS 4	BLTS 4

Appendix B.

The following table was sourced from the Oregon Analysis Procedures Manual Chapter 14.

Table 6: BLTS Criteria for Unsignalized Intersection Crossing Without a Median

Prevailing Speed or Speed Limit (mph)	Total Through/Turn Lanes Crossed (Both Directions)[2]					
	≤ 3 Lanes			4 -5 Lanes		≥ 6 Lanes
	Functional Class/ADT (vpd)					
	Local	Collector	Arterial	Arterial		Arterial
	≤ 1,200	1,200 - ≤3,000	>3,000	≤ 8,000	>8,000	Any ADT
≤ 25	BLTS 1	BLTS 1	BLTS 2	BLTS 3	BLTS 4	BLTS 4
30		BLTS 1	BLTS 3	BLTS 3	BLTS 4	BLTS 4
35		BLTS 2	BLTS 3	BLTS 4	BLTS 4	BLTS 4
≥ 40		BLTS 3	BLTS 4	BLTS 4	BLTS 4	BLTS 4

Pedestrian Experience Index (PEI) Methodology

technical memorandum

prepared for

Tahoe Regional Planning Agency

prepared by

Cambridge Systematics, Inc.

technical memorandum

Pedestrian Experience Index (PEI) Methodology

prepared for

Tahoe Regional Planning Agency

prepared by

Cambridge Systematics, Inc.
38 East 32nd Street, 7th Floor
New York, NY 10016

date

February 20, 2024

Table of Contents

1.0 Pedestrian Experience Index Approach Summary 1-1

2.0 Proposed Factors to Measure the Pedestrian Experience 2-1

3.0 Excluded Factors 3-3

4.0 PEI Weighting 4-3

5.0 Final Scores and Analysis 5-3

6.0 Limitation and Future Work 6-5

1.0 Pedestrian Experience Index Approach Summary

The Pedestrian Experience Index (PEI) analysis is useful for transportation planners and engineers to identify areas that need improvements to enhance the overall pedestrian environment, and better understanding individual factors that influence the day-to-day quality of the pedestrian experience. Understanding individual contributing factors can be used to plan improvements to safety and the built environment, and offset negative impacts on the pedestrian experience such as those related to infrastructure that are challenging to modify.

The PEI analysis results in a numerical score ranging from 0 percent (%) – 100 percent (%) for each road centerline link within the Tahoe Basin transportation system, with higher scores indicating a better pedestrian environment.

The analysis was conducted on road segments throughout the Tahoe Basin. Road segments were defined as road centerline between intersections. Dirt roads were excluded from the analysis.

2.0 Proposed Factors to Measure the Pedestrian Experience

The following table summarizes the PEI variables selected for the Tahoe Regional Planning Agency's (TRPA) analysis. The variables are broken down into 4 categories, including infrastructure, street design, community activity, and economic activity.

1. Infrastructure: A measure of the quality and accessibility of pedestrian infrastructure such as sidewalks, crosswalks, and driveways, influencing the ease and safety of walking.

2. Street Design: An assessment of how streets are laid out and designed, including factors such as block length, tree canopy, and traffic speed, impacting pedestrian comfort and enjoyment.

3. Community Activity: A gauge of the vibrancy and liveliness of the surrounding community, encompassing factors such as the presence of parks and cultural attractions, contributing to the pedestrian experience through opportunities for social interaction and engagement.

4. Economic Activity: An evaluation of the economic vitality and diversity of the area, including factors such as the number of shops which can influence the pedestrian experience.

Table 1: Pedestrian Experience Index Factor Summary

Category	Variable	Source (GIS Layer Name)	Method
Infrastructure	Presence of Sidewalk	TRPA, Active Transportation Infrastructure Data	Higher score assigned to segments with more sidewalk coverage.
	Presence of adjacent Bike Lane	TRPA, Bike Infrastructure Data	Higher score assigned to segments with greater percent coverage of bike infrastructure (Class I, II, IV).
	Density of Driveways	TRPA, Surface type	Lower score assigned to segments with higher driveway densities.
	Density of pedestrian crossing amenities (crosswalk, pedestrian signal, median)	TRPA, Intersections	Greater score to locations with higher density of crossing amenities.
Street Design	Posted Travel Speed	TRPA, Open Street Map	Lower score assigned to roads with higher posted speed limits.
	Block Length	Open Street Map	Higher scores assigned to road segments with shorter block lengths.
	Building Setbacks	Open Street Map and TRPA 2019 Impervious Layer	Higher scores assigned to roads with greater setback.
	Tree Canopy Coverage	TRPA, LiDAR Derivative	Greater score to roads with higher density forest canopy coverage.
	Number of Travel Lanes	TRPA, Open Street Map	Greater score to roads with higher number of travel lanes.
Community Activity	Natural Scenery	TRPA	Greater score assigned to segments with greater percentage of road within scenic boundary.
	Density of amenities	TRPA, town centers	Higher score assigned to segments with greater density of amenities.
	Density of Dwelling Units	TRPA, parcels, number of units	Greater score assigned to locations with greater density of nearby dwelling units.
	Cultural / Historical Importance	TRPA, historic designation data	Greater score assigned to segments with greater density of nearby cultural historical locations.
Economic Activity	Density of Business Addresses	Urban Footprint	Higher scores of assigned to road segments with greater density of amenities.

3.0 Excluded Factors

Several factors were considered but ultimately excluded from the proposed methodology, including the presence of adjacent parking lanes and land use mix. These factors could be included in future updates to this analysis.

1. *Presence of Adjacent Parking Lanes*: This factor was considered in the methodology, but data regarding the presence of adjacent parking lanes was determined to be unavailable during the development of the bicycle level of traffic stress analysis. Therefore, it was excluded from the analysis due to data limitations.

2. *Land Use Mix*: A higher degree of mixed land use patterns is associated with an elevated pedestrian experience. However, a method for estimating land use mix has not been defined by the project team. Additional analysis is required to select and implement a method for defining land use mix.

4.0 PEI Weighting

Once the variables described above were calculated for each road segment, the final PEI score was determined using the weighting scheme outlined below. Before applying the weighting scheme, each percentile rank was used to normalize variable measures between 0% and 100%.

Table 2: Variable Weights

Category	Factor	Factor Weight	Category Weight
Infrastructure	Presence of Sidewalk	50	30
	Presence of Adjacent Bike Lane	20	
	Density of Driveways	10	
	Density of Pedestrian Crossing Amenities	30	
Street Design	Posted Travel Speed	25	25
	Block Length	20	
	Building Setbacks	25	
	Tree Canopy Coverage	20	
	Number of Travel Lanes	10	
Community Activity	Density of Resident Addresses	25	25
	Natural Scenery	25	
	Density of amenities	25	
	Cultural / Historical Importance	25	
Economic Activity	Density of Business Addresses	100	20

5.0 Final Scores and Analysis

Draft results were delivered to TRPA for internal review before finalizing the results. The review was conducted using an online interactive web mapping application.

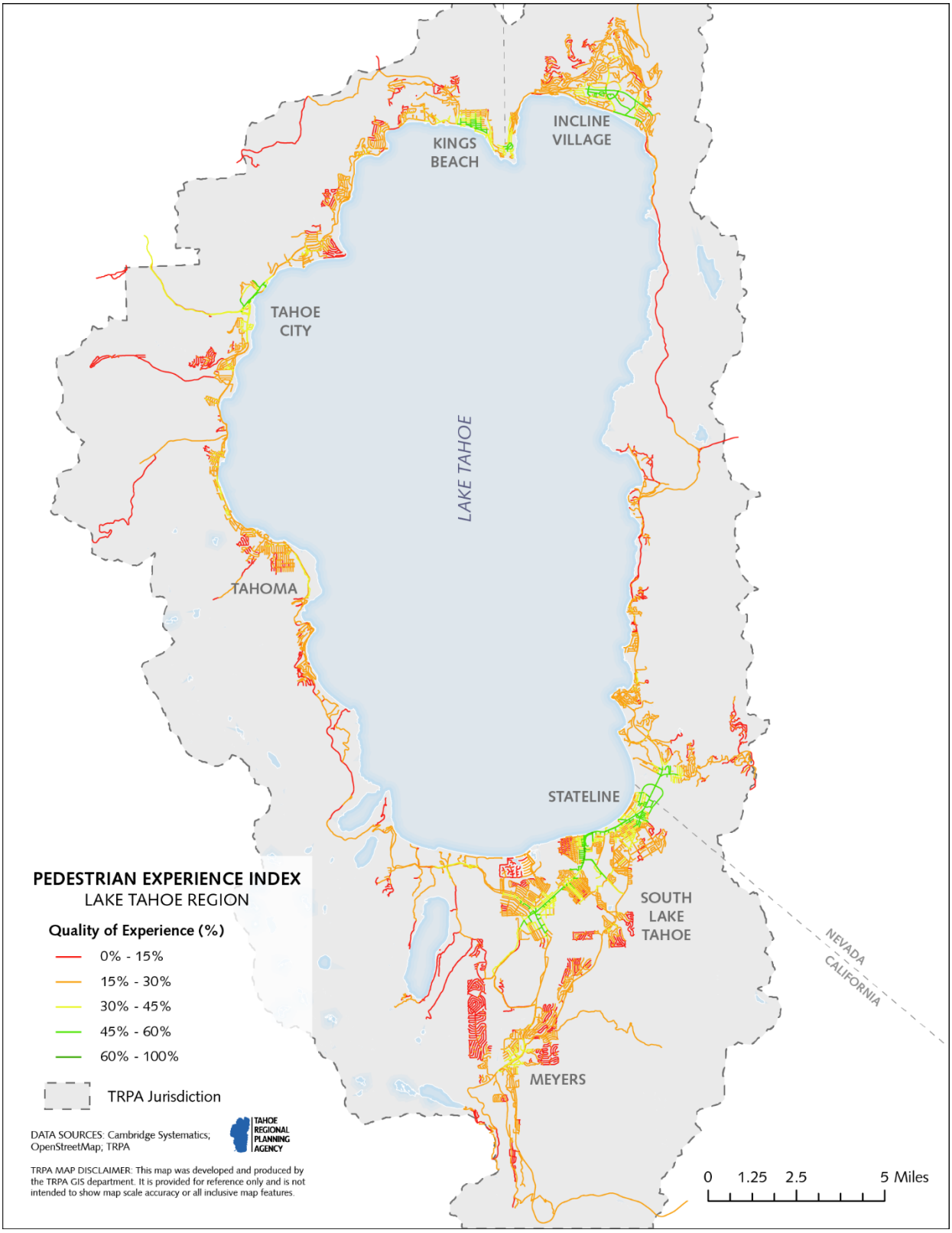

KINGS BEACH
INCLINE VILLAGE
TAHOE CITY
LAKE TAHOE
TAHOMA
STATELINE
SOUTH LAKE TAHOE
NEVADA
CALIFORNIA
MEYERS
PEDESTRIAN EXPERIENCE INDEX
LAKE TAHOE REGION
Quality of Experience (%)
0% - 15%
15% - 30%
30% - 45%
45% - 60%
60% - 100%
TRPA Jurisdiction
DATA SOURCES: Cambridge Systematics; OpenStreetMap; TRPA
TAHOE REGIONAL PLANNING AGENCY
TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.
0 1.25 2.5 5 Miles

Figure 1: PEI Results

The final analysis can be used to explore opportunities to identify areas where the overall pedestrian experience can be improved by factors that are already the subject of policy discussion, such as potential safety improvements, new transportation infrastructure, sidewalk enhancements, and additional amenities.

6.0 Limitations and Future Work

Methodological limitations include the limited literature on the application of the PEI approach in quantifying the pedestrian experience by block face for an entire area. Differences in variable weighting may be appropriate for different types of land use, such as urban vs. rural areas, building setback, or number of dwelling units. In rural areas, the presence of sidewalks and natural scenery may carry more weight than in urban areas that may weigh shopping or building setback more heavily to align with the intended activities of the area.

Future adjustments could involve ground-truthing to refine variable weights or distributing the weighting scheme depending on other independent variables, such as land context information. Additionally, several data sources were excluded from the analysis, including a measure of land use mix and the presence of roadside parking lanes. Future versions of this measure can include new data as it becomes available. Lastly, other data sources could be added to capture the behavioral characteristics of an area, such as bicycle, micromobility, or pedestrian counts, to account for the relative number of interactions people are likely to encounter while walking within a given area.

Appendix D

Bicycle and Pedestrian Monitoring Protocol

2023 BICYCLE AND PEDESTRIAN MONITORING SUMMARY

CONTENTS

Overview 1

Results 2

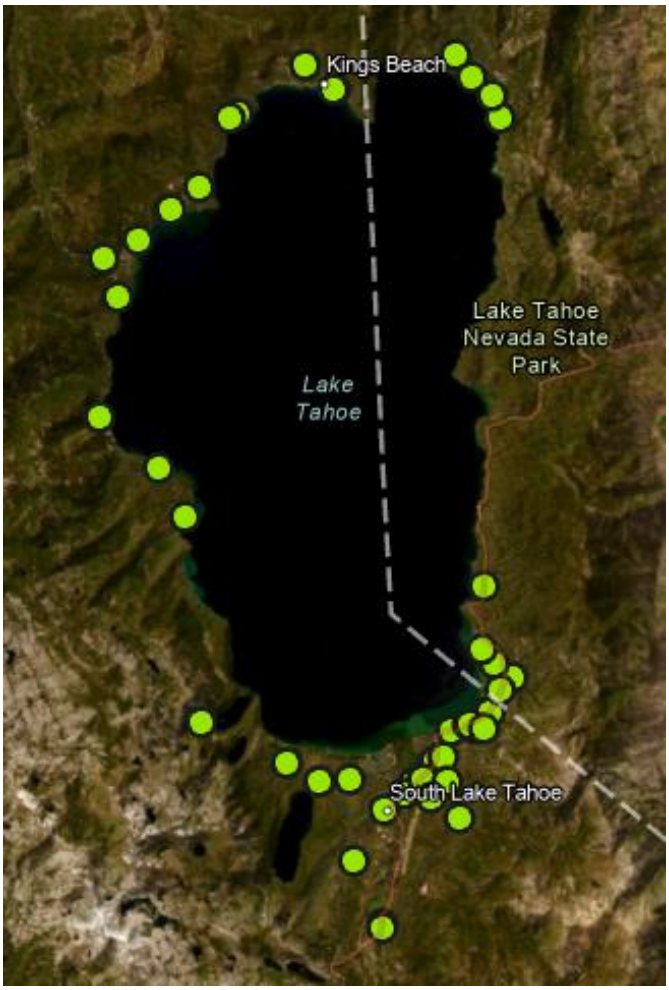
- Annual data 2
- Average Daily Use 3
- Hourly Use 3
- Seasonal Use 4
- Project Monitoring 5
- Fire 5
- New locations 6
- Ongoing issues 6

OVERVIEW

In 2015, as part of the update to the Active Transportation Plan, the Tahoe Regional Planning Agency (TRPA) developed the Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol. Implementation of the protocol began in 2015 with seasonal videos recorded and limited automated counting. In 2016, TRPA purchased automated bicycle and pedestrian counters that collect year-round counts, differentiate between the two different users (bicyclists vs. pedestrians), and collect directional information. Through partnerships with local jurisdictions, these automated counters were installed on shared-use paths throughout the Region. Installation of counters has continued since 2016 and counters are installed when new path segments are constructed.

As of 2023, there are 48 active bicycle and pedestrian monitoring locations around the Lake Tahoe Basin. TRPA and local partners regularly monitor bicycle and pedestrian activity to understand high use areas and trends, measure mode-split, and support infrastructure grant management and reporting. Count information also informs policies and programs targeted to improve and support active transportation. All data can be found at https://monitoring.laketahoeinfo.org and downloaded at https://www.tahoeopendata.org/datasets/bike-and-pedestrian-counts/explore.

Figure 1 Map of all the existing bike and pedestrian monitoring locations.



RESULTS

4.8 million users have been counted across the entirety of TRPA's bicycle and pedestrian monitoring program. On average, 320 people travel past a monitor every day.

Annual Data

A comparison of total users counted by the monitoring network shows that the busiest year to date is 2020 with almost 3 million users. Counts dropped drastically in 2021, but have been climbing since. 2.29 million users were counted across all sites in 2023.

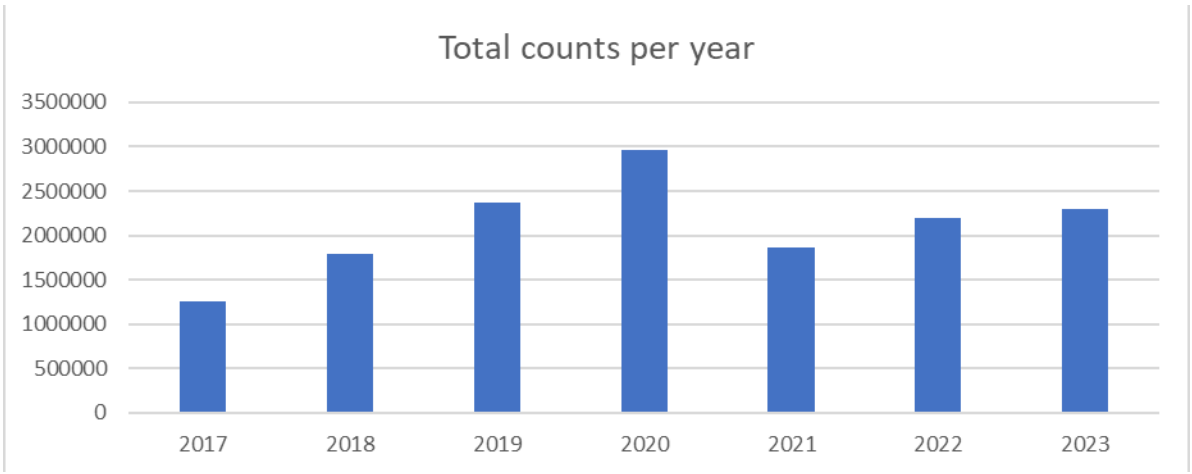


Figure 2 Total users every year 2017-2023

Average Daily Use

Looking at the data for each site, average daily usage ranges from 14 users per day to 1,140. The most used site is at the intersection of US 50 and Pioneer near the Heavenly Village with an average of 1,140 users per day. The next most used monitoring location is on the East Shore trail, then the Lakeside trail in Tahoe City.

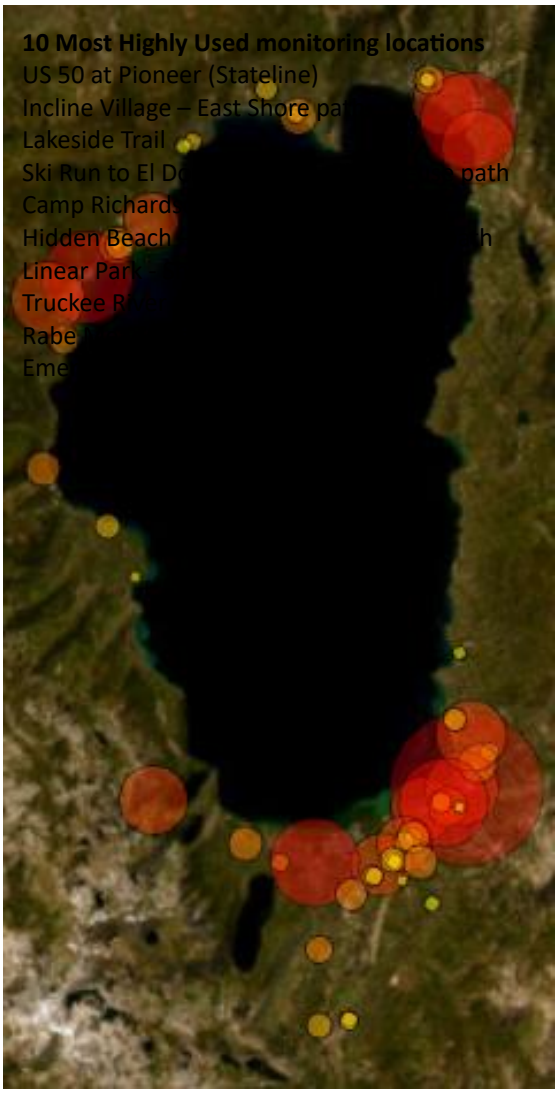


Figure 3: The busiest monitoring location is at US 50 and Pioneer trail near Heavenly Village.

Figure 4. Average Daily Total at each site ranges from 14 users per day to 1140. The lower end of the scale is depicted in smaller yellow icons, the high end in larger red icons.

Hourly Use

Hourly usage varies across different monitor locations. In the figure below, several sites have been selected to show average hourly counts at a few popular locations. The monitoring sites within the City of South Lake Tahoe, which are typically along heavily-used commuting routes include US 50 and Pioneer Trail, Linear Park, Ski Run and Lakeview commons (shown in orange- yellow). These locations have

consistent use throughout the day whereas, popular recreation sites including Emerald Bay and Camp Richardson (shown in green) have a more prounouced peak period between 10am and 4pm.

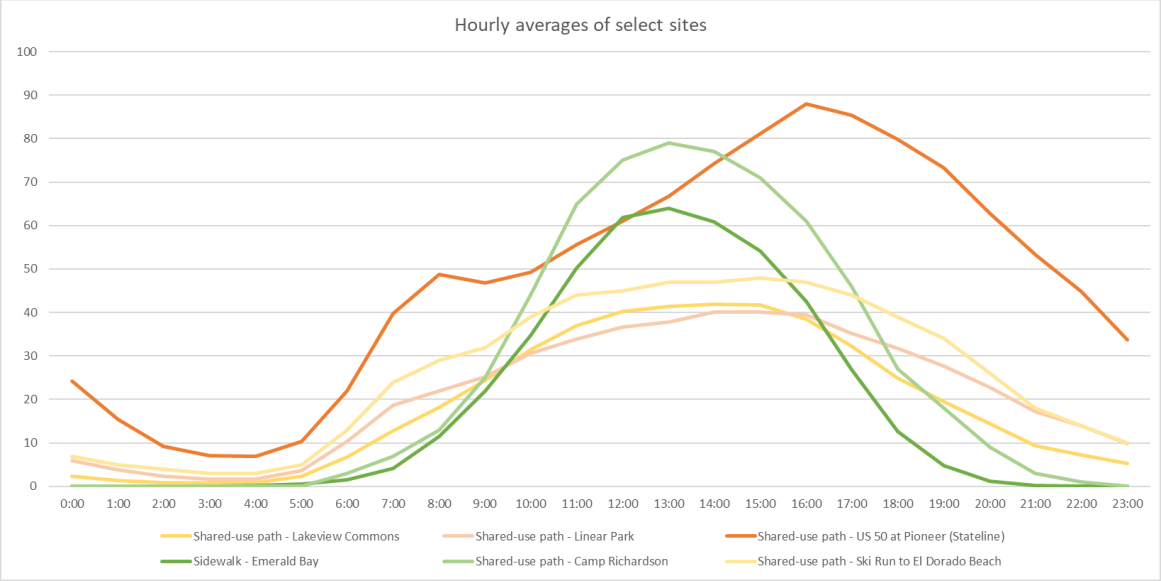

Hourly averages of select sites
100
90
80
70
60
50
40
30
20
10
0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
Shared-use path - Lakeview Commons
Shared-use path - Linear Park
Shared-use path - US 50 at Pioneer (Stateline)
Sidewalk - Emerald Bay
Shared-use path - Camp Richardson
Shared-use path - Ski Run to El Dorado Beach

Figure 5: US 50 at Pioneer and sites along the Lake Tahoe Bikeway have high usage throughout the day compared to Emerald Bay and Camp Richardson.

Seasonal Use

Not surprisingly, use of shared-use paths is strongly driven by the weather. 62 percent of all usage is recorded during summer months (June, July, August, September), 25 percent of use is recorded during off-season months (April, May, October, November), and 13 percent of total path use is recorded during the winter (December, January, February). There are also more cyclists using trails during the warmer months from May-October and more pedestrians during the winter.

Figure 6: Seasonal use percentages across all sites

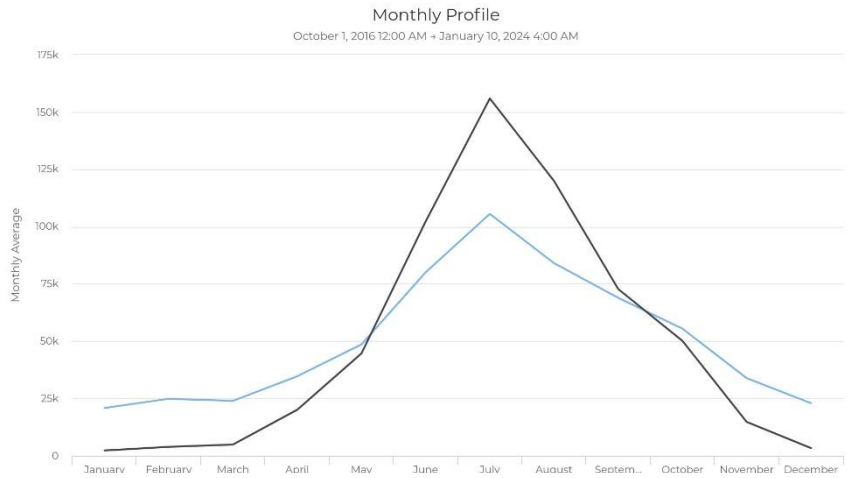


Figure 7 Monthly usage by user type across all sites 2017- Jan 10 2024

Project Monitoring

In addition to regular trend monitoring outlined in the monitoring plan, TRPA has been doing some pre and post project monitoring. The City of South Lake Tahoe completed the Al Tahoe Safety and Mobility Enhancement Project in 2020, which included construction of a shared-use path. Prior to path construction, a dirt path had an average of 54 users per day. After construction monitors recorded an average of 167 users per day, which is an increase of over 300 percent.

Figure 9: A monitor located on Al Tahoe before the Al Tahoe Safety and Mobility Project

Figure 8: After the Al Tahoe Safety and Mobility Project

In 2023, pre-project monitoring took place at Pioneer and Larch, Apache Ave, and Lodi/ Barbara.

Fire/Smoke Impacts

Looking back to the summer of 2021, the Caldor Fire and smoke impacts in the basin dramatically impacted shared-use path utility as evidenced by count data. During the evacuation in August 2021, the number of total users across South Shore locations decreases nearly to zero. The graph below shows counts during the evacuation period (between 8/30-9/6 marked with red lines).

2021 was a particularly smoky season with both the Tamarack fire and Caldor fire close by. The added air quality metric in the graph shows a positive relationship between low path usage and poor air quality. The blue line shows particulate matter PM10 taken from the monitor at the TRPA office. Multiple dates with elevated PM numbers have a drop in trail usage indicating that trail use numbers are affected by poor air quality.

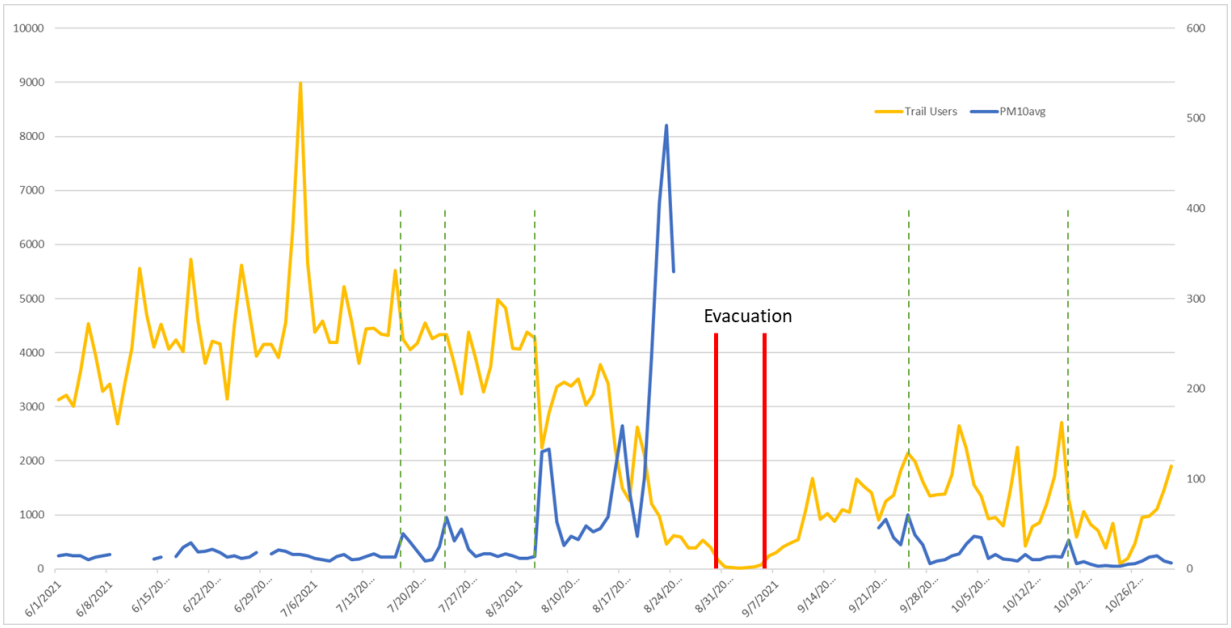


Figure 10. Air Quality and Caldor fire evacuation impacts on path usage. South Lake Tahoe path users are plotted in yellow, Air Quality metric for particulate matter 10 in blue. Caldor fire evacuation period framed in red. Spikes in PM10 are marked with green dotted lines.

New Locations

Sites Added in 2023: Four additional permanent monitors have been added to the network in 2023.

Tahoe City Public Utility District added three new permanent monitors at Northshore, Sunnyside, and Tahoma. Two of these locations are replacing movable trend monitors that are already part of the program.

El Dorado County also added a new monitor on the newly constructed East to West San Bernadino shared-use path (pictured).

Ongoing Issues

There are monitors that require replacement between Lake Tahoe Community College and South Tahoe Public Utility District facility on the Dennis T. Machida Greenway. Responsibility belongs to the City of South Lake Tahoe. This is the only monitor on the greenway.

Two trafx movable monitors were stolen or damaged in 2023 and need to be replaced at a cost of about $500 each. Lock boxes also need to be purchased, which are approximately $40 each.

Appendix E

Maintenance Responsibilities Chart and Template

TAHOE REGIONAL PLANNING AGENCY

Mail
PO Box 5310
Stateline, NV 89449-5310

Location
128 Market Street
Stateline, NV 89449

Contact
Phone: 775-588-4547
Fax: 775-588-4527
www.trpa.gov

MAINTENANCE RESPONSIBILITIES CHART AND PLAN

Entities responsible for the construction and maintenance of all projects containing active transportation facilities are required to submit a Maintenance Responsibilities Chart and Plan prior to permit issuance. The plan must clearly identify responsibilities for capital improvements and annual infrastructure operation and maintenance and identify funding needs and sources. This information will be included in issued permits.

How to Complete the Maintenance Responsibilities Chart and Plan:

1. Fill out each lead entity's name in the top row and assign maintenance roles to each entity by checking the appropriate boxes in the columns. Boxes must be checked in the column that corresponds to the entity responsible for the maintenance task listed in that row. For sections that are not relevant, leave those blank.

2. Applicants must also fill out the anticipated funding sources in the appropriate spaces on the second page and identify the expected funding entity.

3. Before submittal to TRPA, each entity partner must sign the plan at the bottom of the sheet.

Any questions should be directed to the TRPA transportation department at (775) 589-5401.

MAINTENANCE RESPONSIBILITIES CHART AND PLAN

Task	Lead Entity (1)	Lead Entity (2)	Lead Entity (3)	Lead Entity (4)	Lead Entity (5)	Lead Entity (6)
Parking Lots						
Parking Meter Maintenance	☐	☐	☐	☐	☐	☐
Meter Collection / Administration	☐	☐	☐	☐	☐	☐
Sweeping	☐	☐	☐	☐	☐	☐
Garbage Pickup	☐	☐	☐	☐	☐	☐
Litter Patrol	☐	☐	☐	☐	☐	☐
Regulatory Sign Replacement	☐	☐	☐	☐	☐	☐
Visitor Signage	☐	☐	☐	☐	☐	☐
Vista, Transit Stops, & Emergency Turnouts						
Sweeping	☐	☐	☐	☐	☐	☐
Garbage Pickup	☐	☐	☐	☐	☐	☐
Litter Patrol	☐	☐	☐	☐	☐	☐
Restroom Cleaning	☐	☐	☐	☐	☐	☐
Graffiti Removal	☐	☐	☐	☐	☐	☐
Regulatory Sign Replacement	☐	☐	☐	☐	☐	☐
Visitor/Wayfinding/Interpretive Signage	☐	☐	☐	☐	☐	☐
Snow Removal	☐	☐	☐	☐	☐	☐
Scenic Byway Brochures	☐	☐	☐	☐	☐	☐
Bikeway						
Sweeping	☐	☐	☐	☐	☐	☐
Litter Patrol	☐	☐	☐	☐	☐	☐
Regulatory Sign Replacement	☐	☐	☐	☐	☐	☐
Vista Point Interpretive Signs	☐	☐	☐	☐	☐	☐
Public Information	☐	☐	☐	☐	☐	☐
Authorized Trails						
Routine Tread Maintenance	☐	☐	☐	☐	☐	☐
Visitor Signage	☐	☐	☐	☐	☐	☐
Litter Patrol	☐	☐	☐	☐	☐	☐
Monitoring Unauthorized Trails	☐	☐	☐	☐	☐	☐
Public Info/Trail Guides	☐	☐	☐	☐	☐	☐
Transit						
Transit Funding	☐	☐	☐	☐	☐	☐
Bus Operation	☐	☐	☐	☐	☐	☐
Bus Stop Kiosk Maintenance	☐	☐	☐	☐	☐	☐
Brochure Time Table	☐	☐	☐	☐	☐	☐
DMS Messaging	☐	☐	☐	☐	☐	☐
Public Information	☐	☐	☐	☐	☐	☐
Intercept Lot Litter Pickup	☐	☐	☐	☐	☐	☐

Task	Lead Entity (1)	Lead Entity (2)	Lead Entity (3)	Lead Entity (4)	Lead Entity (5)	Lead Entity (6)
Capital Infrastructure Maintenance						
Bus Replacement	☐	☐	☐	☐	☐	☐
Parking Lot Striping	☐	☐	☐	☐	☐	☐
Parking Lot Resealing	☐	☐	☐	☐	☐	☐
Parking Lot Overlay	☐	☐	☐	☐	☐	☐
Parking Lot Concrete – Curbs	☐	☐	☐	☐	☐	☐
Parking Lot Stormwater Treatment Systems	☐	☐	☐	☐	☐	☐
Bike Lane Striping/Resealing	☐	☐	☐	☐	☐	☐
Bikeway Striping/Resealing	☐	☐	☐	☐	☐	☐
Bikeway Overlay	☐	☐	☐	☐	☐	☐
Bikeway Co-location Project	☐	☐	☐	☐	☐	☐
Viewpoint/Highway Transit Stop/Emergency Turnout Striping/Resealing	☐	☐	☐	☐	☐	☐
Viewpoint/Highway Transit Stop/Emergency Turnout Overlay	☐	☐	☐	☐	☐	☐
Bridge Inspections	☐	☐	☐	☐	☐	☐
Interpretive Sign Replacement	☐	☐	☐	☐	☐	☐
Bench Replacement	☐	☐	☐	☐	☐	☐
Bear Proof Can Replacement	☐	☐	☐	☐	☐	☐
Scenic Byway Entry Signage	☐	☐	☐	☐	☐	☐
Monitoring Equipment	☐	☐	☐	☐	☐	☐

Anticipated Funding Sources by Agency:

1. **Agency Name:** _____
   a. **Funding Source(s)** _____
2. **Agency Name:** _____
   a. **Funding Source(s)** _____
3. **Agency Name:** _____
   a. **Funding Source(s)** _____
4. **Agency Name:** _____
   a. **Funding Source(s)** _____

Partner Signatures: *Please make sure to require all partnering agency signatures when formalizing this document.*

_____ (*Signature, Entity*)

_____ (*Signature, Entity*)

_____ (*Signature, Entity*)

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_____ (*Signature, Entity*)

Appendix F

Proposed Active Transportation Project List

EIP NUMBER	ATP 2024 PRIORITY	PROJECT NAME	CLASS	IMPLEMENTER	MILES	ESTIMATED_COST	PHASE	START YEAR	COMPLETE YEAR	URL	CORRIDOR
03.02.02.0085	1	Johnson Meadow Bridge	1	El Dorado County	1.14	$9,153,626	Planning/Design	2020	2027	https://eip.laketaho	MEYERS Y
NOT LISTED	1	Lake Tahoe Blvd bike lanes	2	El Dorado County	1.59	$274,275	Planning	2025	2030		MEYERS Y
01.01.01.0033	1	Tahoe Valley Greenbelt Class 1 Paths	1	City of South Lake Tahoe	0.51	$15,000,000	Implementation	2009	2025	https://eip.laketaho	MEYERS Y
03.02.02.0022	1	Third St Complete Streets	5	City of South Lake Tahoe	0.39	$6,727,500	Deferred	2030	2035	https://eip.laketaho	MEYERS Y
NOT LISTED	1	US Hwy 50 Complete Streets Improvements	5	California Department of Transportation	1.6	$2,300,000	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	2	B Street Overpass	0	California Department of Transportation	0.12	$8,050,000	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	2	Black Bart bike route	3	El Dorado County	1.02	$5,865	Planning/Design	2025	2035		MEYERS Y
03.02.01.0054	2	Fallen Leaf Road Bike Path	1	El Dorado County	1.56	$3,050,000	Planning/Design	2021	2029	https://eip.laketaho	MEYERS Y
NOT LISTED	2	Greenway 4a - Pioneer to Elks Club	1	El Dorado County	1.2	$13,800,000	Planning	2025	2028		MEYERS Y
NOT LISTED	2	Greenway 4b - Elks Club to Nottaway	1	El Dorado County	1	$11,500,000	Planning	2025	2030		MEYERS Y
NOT LISTED	2	Greenway 4c - Nottaway to Golden Bear	1	El Dorado County	1.74	$20,010,000	Planning	2025	2032		MEYERS Y
NOT LISTED	2	Greenway 4d - Golden Bear to Johnson	1	El Dorado County	1.12	$12,880,000	Planning	2025	2032		MEYERS Y
NOT LISTED	2	Hwy 50 to NUT Bike Path	1	California Department of Transportation	0.34	$4,140,000	Planning/Design	2030	2035		MEYERS Y
NOT LISTED	2	Kyburz Ave Bike Route	3	City of South Lake Tahoe	0.48	$2,760	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	2	Lake Tahoe Blvd bike lane - gap closure	2	El Dorado County	0.71	$65,320	Planning/Design	2030	2032		MEYERS Y
NOT LISTED	2	Mt. Rainier Bike Route	3	El Dorado County	0.58	$3,335	Planning/Design	2024	2025		MEYERS Y
NOT LISTED	2	S Upper Truckee Rd Bike Route	3	El Dorado County	4.66	$26,795	Planning/Design	2028	2030		MEYERS Y
01.01.01.0033	2	South Ave Bike Route	3	City of South Lake Tahoe	0.52	$2,990	Implementation	2009	2025	https://eip.laketaho	MEYERS Y
NOT LISTED	2	Tahoe Keys Blvd Complete Streets	5	City of South Lake Tahoe	0.9	$15,525,000	Planning/Design	2035	2040		MEYERS Y
NOT LISTED	2	Viking Rd Bike Path	1	City of South Lake Tahoe	0.28	$3,220,000	Planning/Design	2035	2045		MEYERS Y
03.02.02.0059	2	Washington Ave Complete Streets	5	City of South Lake Tahoe	0.19	$3,277,500	Deferred	2030	2040	https://eip.laketaho	MEYERS Y
NOT LISTED	3	13th St Bike Route	3	City of South Lake Tahoe	0.58	$3,335	Planning/Design	2025	2030		MEYERS Y
NOT LISTED	3	3rd St Bike Route to Barton	3	City of South Lake Tahoe	0.41	$2,358	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	3	5th Ave Bike Route	3	City of South Lake Tahoe	0.15	$750	Planning	2025	2030		MEYERS Y
NOT LISTED	3	B St/Tata Ln Bike Route	3	City of South Lake Tahoe	0.31	$1,783	Planning/Design	2025	2035		MEYERS Y
01.01.01.0033	3	Barton Ave Bike Route	3	City of South Lake Tahoe	0.4	$2,000	Implementation	2009	2025	https://eip.laketaho	MEYERS Y
NOT LISTED	3	Blitzen Rd bike route	3	El Dorado County	1.53	$8,798	Planning/Design	2035	2045		MEYERS Y
NOT LISTED	3	C St Bike Route	3	City of South Lake Tahoe	0.1	$575	Planning/Design	2025	2035		MEYERS Y
03.02.02.0028	3	Christmas Valley Bike Path	1	El Dorado County	2.44	$28,060,000	Planning	2025	2030	https://eip.laketaho	MEYERS Y
NOT LISTED	3	Council Rock Dr bike route	3	City of South Lake Tahoe	0.22	$1,265	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	3	D St Bike Route	3	City of South Lake Tahoe	0.69	$3,968	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	3	Dunlap Dr Bike Route	3	City of South Lake Tahoe	0.27	$1,553	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	3	E St Bike Route	3	City of South Lake Tahoe	0.11	$633	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	3	Glorene Ave Bike Route	3	City of South Lake Tahoe	1.14	$6,555	Planning/Design	2025	2030		MEYERS Y
03.02.02.0071	3	Hwy 50 bike path to airport	1	City of South Lake Tahoe	0.4	$4,600,000	Planning/Design	2035	2045	https://eip.laketaho	MEYERS Y
NOT LISTED	3	James Ave Class I connection	1	City of South Lake tahoe	0.03	$345,000	Planning/Design	2030	2032		MEYERS Y
NOT LISTED	3	Julie Ln Bike Route	3	City of South Lake Tahoe	0.87	$5,003	Planning/Design	2025	2030		MEYERS Y
NOT LISTED	3	Melba Dr Bike Route	3	City of South Lake Tahoe	0.19	$1,093	Planning/Design	2025	2035		MEYERS Y
03.02.02.0065	3	Sawmill to City Bike Path	1	California Department of Transportation	1.39	$15,985,000	Deferred	2030	2040	https://eip.laketaho	MEYERS Y
NOT LISTED	3	Tahoe Mtn to Lake Tahoe Blvd Class I Connector	1	El Dorado County	0.25	$2,875,000	Planning/Design	2035	2045		MEYERS Y
NOT LISTED	3	US hwy 50 bike lane Meyers to City	2	California Department of Transportation	2.01	$606,625	Planning/Design	2025	2035		MEYERS Y
NOT LISTED	3	Wyoming Tahoe Valley Connector	1	City of South Lake Tahoe	0.06	$690,000	Planning/Design	2035	2040		MEYERS Y
03.02.02.0006	Construction 2024	Apache Avenue Complete Streets	5	El Dorado County	0.4	$4,058,000	Planning/Design	2020	2026	https://eip.laketaho	MEYERS Y
NOT LISTED	1	Northwood Blvd Bike path	1	Washoe County	0.61	$7,015,000	Planning/Design	2025	2035		NV SR 28
03.02.01.0061	1	Sand Harbor to Thunderbird Cove Bike Path	1	Tahoe Transportation District	1.21	$46,000,000	Planning/Design	2023	2027	https://eip.laketaho	NV SR 28
03.02.02.0062	1	SR 28 Class I Crystal Bay to Incline	1	Washoe County	2.63	$16,200,000	Planning/Design	2024	2035	https://eip.laketaho	NV SR 28
03.02.02.0072	1	SR28 Preston to Northwood Bike Path	1	Washoe County	0.3	$3,450,000	Deferred	2035	2045	https://eip.laketaho	NV SR 28
NOT LISTED	1	Village Blvd Bike Lanes	2	Washoe County	1.92	$331,200	Planning/Design	2025	2035		NV SR 28
NOT LISTED	2	Country Club Dr Bike Lanes	2	Washoe County	2.68	$462,300	Planning/Design	2025	2035		NV SR 28
NOT LISTED	2	Mt. Rose Hwy Bike Lanes	2	Nevada Department of Transportation	6.63	$1,906,125	Planning/Design	2035	2045		NV SR 28
NOT LISTED	2	SR28 Class 1 Country Club to Glen	1	Washoe County	0.26	$2,990,000	Planning	2030	2035		NV SR 28
NOT LISTED	2	SR28 Class 1 Country Club to Sweetwater	1	Washoe County	0.67	$7,705,000	Planning	2030	2035		NV SR 28
03.02.01.0017	2	Thunderbird Cove to Spooner Improvements	1	Tahoe Transportation District	5.93	$100,810,000	Planning/Design	2026	2040	https://eip.laketaho	NV SR 28
NOT LISTED	3	Mt. Rose Bike Path	1	Nevada Department of Transportation	2.54	$29,210,000	Planning/Design	2035	2045		NV SR 28
NOT LISTED	1	Dolly Varden/Deer St Sidewalks	0	Placer County	0.31	$62,000	Planning	2030	2040		SR 89 28
NOT LISTED	1	Fox & Speckled Complete Streets	5	Placer County	1.16	$20,010,000	Planning/Design	2025	2035		SR 89 28
01.01.01.0168	1	Kings Beach Western Approach - sidewalks	0	Placer County	0.26	$14,222,000	Planning/Design	2016	2026	https://eip.laketaho	SR 89 28
NOT LISTED	1	N Tahoe Trail (Carnelian Ave to Carnelian Bay - 2)	1	Placer County	1.77	$17,700,000	Planning/Design	2030	2040		SR 89 28
03.02.02.0003	1	N Tahoe Trail (Carnelian Ave to N Tahoe Park - 3)	1	Placer County	2.6	$26,020,000	Planning/Design	2008	2030	https://eip.laketaho	SR 89 28
01.01.01.0086	1	N Tahoe Trail (Dollar Point to Carnelian Bay - 3)	1	Placer County	1.73	$7,730,000	Planning/Design	2021	2025	https://eip.laketaho	SR 89 28
NOT LISTED	1	Stateline to Kings Beach Sidewalks	0	California Department of Transportation	0.8	$184,000	Planning	2030	2040		SR 89 28
03.02.02.0089	1	Tahoe City Lakeside Trail Missing Link	1	Placer County	0.19	$1,000,000	Planning/Design	2018	2024	https://eip.laketaho	SR 89 28
NOT LISTED	2	Kings Beach to Stateline Shared Use Path	1	Placer County	1.88	$36,754,000	Planning/Design	2035	2045		SR 89 28
NOT LISTED	2	Lake Forest Rd Complete Streets	5	Placer County	0.9	$15,525,000	Planning/Design	2025	2035		SR 89 28
NOT LISTED	2	Tahoe City Golf Course Shared-use Path	1	Placer County	0.35	$4,025,000	Planning/Design	2024	2028		SR 89 28
NOT LISTED	3	Donner Rd bike Route	3	North Tahoe Public Utility District	0.22	$1,265	Planning/Design	2025	2035		SR 89 28
NOT LISTED	3	North Tahoe Regional Trail (Segment 4)	1	Placer County	0.53	$6,095,000	Planning/Design	2025	2035		SR 89 28
03.02.02.0029	2	Baldwin Beach Bike Path	1	U.S. Forest Service - Lake Tahoe Basin Management Unit	0.36	$1,450,000	Implementation	2017	2025	https://eip.laketaho	SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 1	1	Unknown	1.61	$11,772,259	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 10	1	Unknown	1.49	$19,669,449	Planning/Design	2022	2050		SR 89 REC

NOT LISTED	2	Cascade to Meeks Trail - Segment 2	1	Unknown	0.93	$13,084,385	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 3	1	Unknown	2.05	$12,780,296	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 4	1	Unknown	1.87	$37,258,815	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 5	1	Unknown	0.88	$7,930,359	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 6	1	Unknown	1.2	$35,062,182	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 7	1	Unknown	1.51	$35,355,831	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 8	1	Unknown	0.95	$94,426,500	Planning/Design	2022	2050		SR 89 REC
NOT LISTED	2	Cascade to Meeks Trail - Segment 9	1	Unknown	1.41	$35,186,430	Planning/Design	2022	2050		SR 89 REC
03.02.02.0030	2	Pope Beach Bike Path	1	U.S. Forest Service - Lake Tahoe Basin Management Unit	0.17	$1,955,000	Deferred	2020	2030	https://eip.laketaho	SR 89 REC
NOT LISTED	1	Elks Point Rd Bike Lane Extension	2	Douglas County	0.09	$8,280	Planning/Design	2025	2035		US 50 ES
03.02.01.0032	2	Stateline to Stateline Bikeway D, E, F	5	Nevada Department of Transportation	11.39	$196,477,500	Planning/Design	2035	2045	https://eip.laketaho	US 50 ES
03.02.02.0092	1	Bijou Bike Park Connector	1	City of South Lake Tahoe	0.57	$1,849,056	Planning/Design	2021	2025	https://eip.laketaho	US 50 SS
NOT LISTED	1	Hwy 50 at Stateline Bike Lanes (NV)	2	Nevada Department of Transportation	0.86	$247,250	Planning/Design	2025	2035		US 50 SS
03.02.02.0093	1	Johnson Blvd Complete Streets	5	City of South Lake Tahoe	0.98	$4,346,450	Planning/Design	2025	2028	https://eip.laketaho	US 50 SS
03.02.01.0055	1	Kahle Drive Complete Street	5	Nevada Tahoe Conservation District	0.88	$3,631,339	Planning/Design	2018	2025	https://eip.laketaho	US 50 SS
03.02.02.0058	1	Kingsbury to Stateline Sidewalk	0	Douglas County	0.3	$500,000	Planning/Design	2025	2035	https://eip.laketaho	US 50 SS
NOT LISTED	1	Lake Pkwy South Sidewalks	0	City of South Lake Tahoe	0.22	$44,000	Planning	2030	2040		US 50 SS
03.02.02.0055	1	Laura Dr to Stateline Bike Path	1	Tahoe Transportation District	0.42	$4,830,000	Planning/Design	2024	2030	https://eip.laketaho	US 50 SS
03.02.01.0060	1	Park Avenue and Lakeshore Blvd Complete Streets	5	City of South Lake Tahoe	0.73	$6,500,000	Planning/Design	2025	2030	https://eip.laketaho	US 50 SS
03.02.02.0095	1	South Tahoe Greenway Phase 1c	1	California Tahoe Conservancy	0.54	$9,500,000	Planning/Design	2022	2028	https://eip.laketaho	US 50 SS
03.02.02.0097	1	Spruce and Blackwood SRTS	5	City of South Lake Tahoe	0.89	$15,352,500	Planning/Design	2025	2030	https://eip.laketaho	US 50 SS
03.02.02.0096	1	Stateline Avenue Complete Streets Project	5	City of South Lake Tahoe	0.45	$6,750,000	Planning/Design	2025	2030	https://eip.laketaho	US 50 SS
03.01.02.0030	1	Van Sickle Phase III Shared Use Trails	1	California Tahoe Conservancy	0.44	$6,000,000	Planning/Design	2022	2025	https://eip.laketaho	US 50 SS
NOT LISTED	2	Complete streets from Pioneer Trail to Heavenly	5	City of South Lake Tahoe	0.9	$13,500,000	Planning	2040	2050		US 50 SS
NOT LISTED	2	Fairway Dr Bike Lanes	2	City of South Lake Tahoe	0.37	$34,040	Planning/Design	2025	2035		US 50 SS
NOT LISTED	2	Glenwood Way bike lanes	2	City of South Lake Tahoe	1.6	$147,200	Planning/Design	2035	2045		US 50 SS
03.02.02.0076	2	Greenway Phase 3 - Ski Run Blvd to Van Sickle	1	California Tahoe Conservancy	1.45	$25,000,000	Planning	2028	2032	https://eip.laketaho	US 50 SS
NOT LISTED	2	Herbert Ave Complete Streets	5	City of South Lake Tahoe	0.51	$7,650,000	Planning/Design	2030	2040		US 50 SS
NOT LISTED	2	Herbert Ave Sidewalks	0	City of South Lake Tahoe	0.47	$75,200	Planning	2035	2045		US 50 SS
NOT LISTED	2	Johnson Blvd to Lester Ave bike path connector	1	City of South Lake Tahoe	0.32	$3,680,000	Planning/Design	2035	2045		US 50 SS
03.02.01.0007	2	Lake Pkwy Complete Streets	5	Tahoe Transportation District	0.52	$8,970,000	Planning/Design	2025	2027	https://eip.laketaho	US 50 SS
NOT LISTED	2	Lake Pkwy South Bike Lanes	2	City of South Lake Tahoe	0.27	$46,575	Planning/Design	2035	2045		US 50 SS
NOT LISTED	2	Link Road to Sussex Ave	1	California Tahoe Conservancy	0.16	$6,000,000	Planning	2028	2032		US 50 SS
03.02.02.0094	2	Palmira Ave Connector	1	City of South Lake Tahoe	0.14	$1,370,000	Planning/Design	2022	2027	https://eip.laketaho	US 50 SS
NOT LISTED	2	Ski Run Blvd Bike Lanes	2	City of South Lake Tahoe	0.59	$101,775	Planning/Design	2025	2035		US 50 SS
NOT LISTED	2	Spruce Class 1 Connector Bridge	1	U.S. Forest Service	0.08	$1,360,000	Planning	2025	2030		US 50 SS
NOT LISTED	3	Hwy 50 at Stateline Bike lanes (CA)	2	California Department of Transportation	0.89	$255,875	Planning/Design	2025	2035		US 50 SS
NOT LISTED	3	Los Angeles Ave bike route	3	City of South Lake Tahoe	0.19	$1,093	Planning/Design	2025	2035		US 50 SS
NOT LISTED	3	Marlette Cir bike route	3	City of South Lake Tahoe	0.1	$575	Planning/Design	2025	2035		US 50 SS
NOT LISTED	3	Marlette Cir to Rufus Allen class I connector	1	City of South Lake Tahoe	0.1	$1,150,000	Planning/Design	2025	2035		US 50 SS
NOT LISTED	3	Oakland Ave bike route	3	City of South Lake Tahoe	0.71	$4,083	Planning/Design	2035	2045		US 50 SS
NOT LISTED	3	Oakland Ave class I bridge over trout creek	1	City of South Lake Tahoe	0.12	$2,346,000	Planning/Design	2035	2045		US 50 SS
NOT LISTED	3	Pine Ridge Dr to Kahle Class I	1	Douglas County	0.48	$5,520,000	Planning/Design	2035	2045		US 50 SS
NOT LISTED	3	Pineridge Dr Bike route	3	Douglas County	0.27	$1,553	Planning/Design	2035	2045		US 50 SS
03.02.02.0080	3	Rufus Allen Blvd Complete Streets	5	City of South Lake Tahoe	0.76	$13,110,000	Deferred	2030	2035	https://eip.laketaho	US 50 SS
NOT LISTED	3	San Francisco Ave bike route	3	City of South Lake Tahoe	0.75	$4,313	Planning/Design	2035	2045		US 50 SS
NOT LISTED	3	Spruce Bike Route	3	City of South Lake Tahoe	0.15	$750	Planning/Design	2030	2030		US 50 SS
NOT LISTED	3	Tamarack Ave Sidewalks	0	City of South Lake Tahoe	0.48	$96,000	Planning	2040	2050		US 50 SS
NOT LISTED	3	Victor St bike route	3	City of South Lake Tahoe	0.05	$288	Planning/Design	2025	2035		US 50 SS
NOT LISTED	3	Wildwood Ave Sidewalks	0	City of South Lake Tahoe	0.32	$64,000	Planning	2040	2050		US 50 SS
03.02.02.0078	Construction 2024	Pioneer Trail Sidewalk	5	City of South Lake Tahoe	0.46	$5,118,028	Implementation	2017	2024	https://eip.laketaho	US 50 SS

Appendix G

Adoption Resolutions

TAHOE METROPOLITAN PLANNING ORGANIZATION
TMPO RESOLUTION NO. 2024 – 02

ADOPTION OF THE 2024 ACTIVE TRANSPORTATION PLAN

WHEREAS, the Tahoe Basin was designated a Metropolitan Planning Organization in 1999 by the Governors of California and Nevada under authorization provided in the Transportation Equity Act for the 21st Century (TEA-21); and

WHEREAS, the current federal transportation bill, the Infrastructure Investment and Jobs Act (IIJA) requires that active transportation modes, like biking and walking be given due consideration in transportation planning process of Metropolitan Planning Organizations; and

WHEREAS, the Tahoe Metropolitan Planning Organization (TMPO) is responsible for fulfilling metropolitan transportation planning requirements under 23 CFR Part 450; and

WHEREAS, the TMPO has updated the 2018 Linking Tahoe: Active Transportation Plan, now titled 2024 Active Transportation Plan, for the Tahoe Basin in support of Federal, State, Regional and local goals and in coordination with the Federal Highway Administration, the State of California and the State of Nevada local agencies and other partners; and

WHEREAS, the updated plan underwent an in-depth public outreach process in accordance with the TMPO Public Participation Plan; and

WHEREAS, the routes, alignments and classifications contained in this plan are conceptual in nature, are not intended to be specific project locations, and the maps contained therein are for illustrative purposes only; and

WHEREAS, the TMPO prepared an Initial Environmental Checklist and determined the plan would have no significant environmental effects; and

WHEREAS, subsequent project development actions to implement the proposed projects within the plan must undergo all necessary environmental review and complete applicable TRPA, federal, state, county, and local project review procedures.

NOW THEREFORE, BE IT RESOLVED that the Governing Board of the Tahoe Metropolitan Planning Organization adopts the 2024 Active Transportation Plan; and

BE IT FURTHER RESOLVED that the Governing Board of the Tahoe Metropolitan Planning Organization delegates authority for approval of technical updates to the 2024 Active Transportation Plan to the TRPA Executive Director; and

PASSED and ADOPTED by the Governing Board of the Tahoe Metropolitan Planning Organization at its regular meeting held on April 24, 2024, by the following vote:

Ayes: Ms. Aldean, Mr. Bass, Ms. Bowman (for Mr. Aguilar), Ms. Conrad-Saydah, Ms. Diss, Ms. Faustinos, Ms. Gustafson, Ms. Hill, Mr. Hoenigman, Ms. Hales (for Mr. Rice), Ms. Leumer, Mr. Settelmeyer, Mr. Walker (US Forest Service)

Absent: Ms. Laine, Ms. Williamson

Cindy Gustafson, Chair
Tahoe Metropolitan Planning Organization
Governing Board